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# GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXV. No. 3175.] LONDON, MARCH 19, 1924. [76TH YEAR. PRICE 1s.



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VOL. CLXV., No. 3175.] WEDNESDAY, MARCH 19, 1924. [76TH YEAR.


## EDITORIAL NOTES.

### The Miners' Resolve.

THE coal and general fuel outlook is about as black as it can be; and should a strike of the miners unfortunately happen within a month, the country will be in a very precarious position. During recent weeks the cold weather has created a demand for household coal which has caused stocks at merchants' depôts to be depleted, and whatever coal is delivered to them is quickly distributed. In short, they cannot now meet the demand. Simultaneously, too, in view of the doubtful position after April 17, the home industrial demand has been pressing, but largely unsatisfied. It is a good thing that the continental demand has not latterly been so heavy as it was for some months previously. The industrial demand will be more urgent than ever in view of the rejection by the miners' delegates of the coal-owners' offer of terms for a new agreement. There are gas engineers who are not feeling at all comfortable over the position to-day. The predicament of these was illustrated by the retiring President of the Midland Association of Gas Engineers and Managers (Mr. P. N. Langford) last Thursday, when he said that the coal and coke question was very acute. In his own case, he has no coke, and cannot get more coal. Mr. B. W. Smith, too, referred to the scarcity of coke as being a very difficult question at the present time. The demand for gas coke, both for home use and export, has been remarkable; but in view of the nebulous coal prospect, there are some gas engineers who devoutly wish they had a margin of stock as a stand-by for their water-gas plants. Those who have not made due provision will find their difficulties increased; and the hope will become more fervent still that the four weeks from to-day will see a settlement of the mining trouble, and then all will be well—except for one thing. That is, it looks very clear now that there can be no settlement which will not in some degree affect the price of coal.

The offer which the owners made, and which the miners' delegates last Thursday rejected, appears to most people to be, in the circumstances of the industry, a generous one. This, we believe it may be said, was the view of certain prominent leaders in the Miners' Federation; but the predominant element in the counsels of that body to-day is constituted of the extremists in those districts in which prevails the greatest discontent with wages. Those are the areas in which the lowest average production per man is realized—partly through the conditions of the mines, and partly through the operation of causes personal to the men. And, of course, if a longer day than seven hours was worked, this again would favourably affect costs, which, under the national agreement, would result in more wages for the men. It will be well to place on record the official (and, it is understood, final) terms offered by the Mining Association to the Miners' Federation.

1. (*a*) Standard profits shall consist of 15 p.ct. of standard wages, instead of 17 p.ct. as at present. (*b*) The surplus remaining after the deduction from proceeds of the cost of standard wages, costs other than wages, and standard profits, shall be divided between wages and profits in the proportions of 87 p.ct. to wages and 13 p.ct. to profits, instead of the present proportions of 83 p.ct. to wages and 17 p.ct. to profits.
2. The general minimum percentage on standard wages shall be increased from 20 to 30.
3. In no district shall the wages of any adult able-bodied day-wage workman fall below a figure 40 p.ct. above the standard wages (as defined in clause 7 of the Wages Agreement) of the lowest paid class of day-wage workman in the district. For this purpose the word "district" means each district within an area where the area comprises more than one district, and not the area as a whole.
4. In addition to the provision made in paragraph (3) for improving the position of the lower paid classes of day-wage workmen, subsistence wages shall be paid in those areas in which they have been, or may in future be, fixed by the District Board as provided by clause 5 of the existing Agreement. The amounts of the existing maximum subsistence wages and allowances already fixed by the district boards shall be increased by one eighth.
5. There shall be effective recoupment of deficiencies below standard profits, but only one-half of any future surplus available for this purpose in any one ascertainment shall be so applied, and the remaining half shall be divided between wages and profits in the agreed proportions—any balance of the deficiency being again carried forward.

Regarding these terms, it may be mentioned that the present agreement lays down that standard profits shall be 17 p.ct. of standard wages. The miners demand that they should be 13 p.ct. of standard wages. Thus it will be seen the colliery owners have conceded half the demand. Then the present agreement lays down that the surplus shall be divided between wages and profits in the proportion of 83 p.ct. to wages and 17 p.ct. to profits. The miners demanded that the share of the surplus allotted to profits should be 13 p.ct. of the share allotted to wages. The owners conceded that 13 p.ct. of the surplus itself should be so allotted. Further, the present agreement lays down that, taking the standard and the surplus together, out of 217 parts of the divisible proceeds of the industry, wages shall receive 183 parts, or 84·3 p.ct. The miners demanded that, taking the standard and the surplus together, out of 226 parts of the divisible proceeds, wages should receive 200, or 88·5 p.ct. The owners' concession means that, taking the standard and the surplus together—in those districts where there is a surplus—out of 215 parts of the divisible proceeds of the industry, wages receive 187 parts, or 86·9 p.ct. The miners demanded that the general minimum percentage should be increased from 20 to 40. The owners conceded an advance to 30 p.ct. An increase in the general minimum to 30 p.ct. on the standard wages means that, in the districts on the minimum, every man, piece-workers included, would obtain at least one twelfth more than his present earnings, apart from the greater increase to the lower-paid men; and the reduction in the owners' ratio of profit would tend to bring such districts above the minimum. In the more prosperous districts, the reduction in the ratio of profits to wages would give all men a substantial advance, and in these districts as well the lower-paid men would specially benefit.

However, the terms have been rejected by the delegates—foolishly, most people will think who are capable of intelligently examining them. But the rejection is perhaps not so much on the merits of the offer, as a hope to get more by a political move; and this has placed the Labour Government in a most unhappy situation. Immediately following the rejection came the decision that the Government should be urged to secure the passage into law of the Minimum Wage Bill (a private member's measure), the second reading of which was due next Friday. The Prime Minister was at once placed on the horns of a dilemma. About 25 p.ct. of his following are composed of miners' representatives, and eight of his colleagues in the Ministry are miners' members. Consequently, Mr. MacDonald has yielded to the pressure; and so from a state of independence and neutrality the Government have been forced

into the position of partizans, by promising to introduce as a Government measure a new Minimum Wage Bill for the miners. Class representation is apparently a disqualification for competent, independent government. However, time is short. On April 17 the present agreement expires. Quick work will be expected of the Government, and this, we imagine, will be impossible in the circumstances. Nothing is yet known as to the nature of the Bill that will be introduced. But any Minimum Wage Bill must be of a contentious order. The principle of a legal minimum wage will be, and must be, resisted by every industry; and, surveying the ground, it does not appear possible that the Government will be able to secure the necessary measure of support in either House. The miners have managed to create a very grave position for the Government, who are even now hoping that negotiation will provide for them an avenue for escape from a perilous position. Developments will now be watched hour by hour.

## The Declared Value and Other Requirements.

CONGRATULATIONS and regret were mingled last Thursday at the meeting of the members of the Midland Association of Gas Engineers and Managers, over the almost immediate departure of the President (Mr. C. H. Carder, of Oldbury) from their midst. He, to all intents and purposes, made a record by being an acting President for one day only. The reason for this is that he has been appointed Chief Gas Engineer to the City of Rio de Janeiro Tramway, Light, and Power Company; and he has to leave for South America almost immediately to take up his new duties. Those constituting the professional gas element in the Midlands will feel themselves the poorer for this change; but very sincere are the good wishes that will accompany Mr. Carder in carrying the skill and fine traditions of British gas engineering to distant Rio. That skill and those fine traditions will have a worthy exponent and practitioner in Mr. Carder. Partly through the change and partly through other circumstances, the intentions of the President were frustrated regarding the material which was to compose his address, and which, had the intentions been possible of fulfilment, would have supplied a deliverance of outstanding interest, and in some respects novelty. The address, fragmentary though it was, shows the lines upon which Mr. Carder's mind and work have been running, as well as the points which he would have developed had opportunity allowed.

The address was really a light survey of current problems; and many of these are the fruit of those strenuous years of war and subsequently when in the gas industry we were doing many things which would not otherwise have been done, but which have proved enlightening and productive of advance. Those storm-ridden and black years did more to open the eyes of the men of the industry, to develop their imaginations, and to present new work than would have been the case probably in decades had we continued in the old normal ways of pre-war years. Those years, packed as they were with adversity, also did much to consolidate and strengthen the position of the industry; and the gains go far to counterbalance the heavy financial losses that were concurrently sustained. We did not before then know how near were large economies for the industry, which were to be realized by merely breaking through the separating medium which had been provided by our old parliamentary, technical, and trading practices. That is all changed now; and Mr. Carder makes the point of how the forcing of plant in the war and after-years has "led to closer investigation of underlying principles, and to the rapid development of progressively more efficient types of plant or methods of control," and this in many directions. But the principal point made has reference to the quality of gas to be supplied under the new order of things instituted by the Gas Regulation Act. He emphasized the point which is all too frequently overlooked—that "quality" comprises more than the one factor of calorific power. Of course, calorific value—the economical, and the locally suitable, calorific value—of the gas is of pre-eminent importance; but that importance is largely vitiated if specific gravity is not right. This point was one among many others insisted upon by Mr. E.V. Evans in his Cantor Lectures; and in them he showed how in the case of coal gas density could be satisfactorily and efficiently governed by a measured small introduction of waste gases. In the case of the South Metropolitan Company, if they did not control the specific gravity of their gas, they would not be able to maintain (as they effectively do) their lighting load with the inverted incandescent burner. In the case of Mr. Carder, he would have lost much of his industrial furnace load if he had not kept the specific gravity of his gas constant within narrow limits.

Regarding the calorific value to be declared, decision must not rest solely upon maximum manufacturing economy, but the line must be found at which manufacturing economy coincides with maximum efficiency for the more critical applications of gas in the district of supply. That is the common sense of the problem for each undertaking, though inclination has had a tendency more to determination on manufacturing economy than on utilization efficiency. Mr. Carder accentuated other broad considerations. One is that a too high declared value definitely limits the type of plant and the class of coal; and future market conditions may unduly inflate the price of gas to the consumer. That is certainly a point that should not be overlooked, though this is provided for by the Gas Regulation Act in legislating for changes, as desirable, in the declared calorific value. But it is a point for consideration that the proportion of available rich gas-making coals is diminishing, while the proportion of lower qualities is increasing; and this is one of the difficulties with which the coalmining industry has to contend, inasmuch as the production costs of the latter variety of coal may be as great as, and even greater per ton than, the former, and yet the market values may not be much lower. But the condition is one of which sight should not be lost in making declaration, and in selecting plant. One is too prone not to look sufficiently forward. On the other hand, as Mr. Carder points out, too low a declared value means largely increased storage accommodation, and unduly large distributing mains, services, meters, and house piping to provide a sufficient reserve of thermal capacity, and convey it to the consumer in ample bulk to be effective for its purpose in reasonable time. In connection, too, with a low declared calorific power, this must be considered in relation to any increase of capital cost which may be involved. At Oldbury, Mr. Carder made an experimental investigation to ascertain where the balance of economical production and utilization lay. The gas was gradually reduced in calorific value. When it reached 430 B.Th.U. per cubic foot, trouble was experienced; and it was ascertained that any further decrease would seriously affect the cookers and furnaces on the district. The quality was then brought back to about 470 B.Th.U.; and it was found that somewhere between 450 and 470 B.Th.U. was, with the appliances in use on the district, the most satisfactory all-round quality, and one that could be produced at reasonable cost. To determine the calorific value to be declared without having regard to all the factors in the case is an unsafe course of procedure. Mr. Carder has settled the point so far as Oldbury is concerned, and so it may be anticipated that there will be no necessity for some time to come to disturb this condition in supply, unless some unfortunate emergency arises.

In the remainder of the address, the President showed there is much work to be done by many undertakings in adapting their plant to the new circumstances and requirements of the times. All around change goes on; and gas undertakings have to rearrange and reorganize in order to conform to the fresh needs. But some of those who are responsible for gas undertakings seem to labour under the impression that their own practices are altogether immune from the laws of progress, which produce and compel change. Those who entertain that impression will find their ability to serve will shrink, and their place progressively occupied by other agencies.

## Space Saving with Increased Results.

AN engineer has to plan according to his local circumstances; and the result is that what he evolves may not be in all respects what he would have designed had he been dealing with a virgin site of ample area for his purposes. An engineer must not therefore always be judged by the perfection of his plant and its lay-out, but by the degree of success that he achieves in the circumstances in which he is placed. This is the case of Mr. C. M. D. Belton, of Shrewsbury, as will be seen from the paper he read at the meeting of the Midland Association of Gas Engineers and Managers last Thursday. He has made, in a scheme of manufacturing plant modernization, the best possible use of his circumstances, though the result in the matter of accessories to his new plant is not altogether what he would have desired.

But on the old site he has succeeded in largely extending the productive ability of his works. In his old horizontal retort-house, he has found room for a carburetted water-gas plant of 300,000 c.ft. capacity; but he could not find suitable accommodation for a special boiler or for separate purifiers for this plant. Certain of the arrangements necessitated by these conditions are makeshifts, to alter which time may some day supply an opportunity. But the water-gas plant represents in productive capacity less than one-third of what Mr. Belton has accomplished on one-half of the ground space of the old horizontals. Upon it he has also put vertical settings (together with the power plant) capable of producing 750,000 c.ft. of gas per day; the remainder of the house being left available for other purposes. With the vertical retorts, steaming the charges, and the carburetted water-gas plant, the ability to govern output quantitatively and qualitatively is considerable; and owing to this, and the fact that consumers had for a long period been accustomed to gas of 450 B.Th.U., and their appliances had been adjusted to that quality, it was decided to make 450 B.Th.U. the declared value. Regular scientific control is exercised; and thus constant results are obtained in respect of the composition and calorific value of the gas. From the vertical retort working, 83·58 therms are produced per ton of coal; the calorific value per cubic foot being 457 B.Th.U. gross, with 9·2 p.ct. of inerts. A considerable amount of data as to results is given in the paper. Though circumstances were not perfect for carrying out all that Mr. Belton would have liked to do in the matter of auxiliary plant, the Shrewsbury Gas Company are doing excellently with their new gas-manufacturing possessions. The concluding part of the paper deals with the elimination of waste. The predominant uneconomy that Mr. Belton would like to see largely reduced is due to the inert content of coal. His calculations as to the direct monetary losses sustained are illuminating, and illustrate their importance to every gas undertaking. But even the figures he quotes could be magnified still more if capital, fuel, and the labour costs of attending to the furnaces were added.

## Gas Trading Progress and Street Lighting at Sheffield.

WE always feel more than ordinary interest in the gas and electricity affairs of Sheffield. There is keenness in the rivalry of the sides; and the two undertakings have executive heads who provide no opportunities for each other where such can be avoided. Of course, electricity is hard put to it in these days when thermal values are taking larger place in industrial considerations, and there is deliberation over how much thermal energy is purchasable at a given price, and how much of that energy can be put to effective use in the circumstances of its application. When the Electrical Engineer sees that his friend Mr. Ralph Halkett is offering 100,000 B.Th.U. to the domestic consumers for 7·2d. per therm, and that at (say) 1d. per KW.-hour, the best electricity can do for 7·2d. is to offer 24,624 B.Th.U., he knows that all the arguments in the world will not assure the domestic consumer that the efficiencies of electrical application will wipe out the thermal value difference of 75,376 B.Th.U. This would be too much to expect the layman to swallow; any such claim would only make those with knowledge of these matters laugh scornfully over the ignorance that gave vent to it. Then the lowest price at present charged to large gas consumers is 4·6d. per therm; and at 1d. per KW.-hour for electricity the industrial user would have available for 4·6d. 15,732 B.Th.U. to set against the 100,000 B.Th.U. The situation is not by any means a happy one for electricity; but the superior position of gas is a matter inherent to itself.

In his speech at the annual meeting of the Sheffield Gas Company, the Chairman (Lieut.-Col. H. K. Stephenson) stated that if electricity had been used for all the purposes for which gas had been sold during the past year, some 126,000 tons more coal would have had to be consumed, and 20,000 tons of tar and 4000 tons of sulphate of ammonia would not have been made. This reminds us of the statement made by the Governor of the Gas Light and Coke Company (Mr. D. Milne Watson) at the recent meeting of the proprietors, which showed that, if the services rendered by that Company through the agency of gas had been performed by electricity, then an extra million tons of coal would have had to be consumed, with loss of the products. From the national and every other point of view, it is a good thing that electricity has not usurped, and is not likely to usurp, the functions of gas. These things have to be looked at from more than the one point of view of municipal trading; there are the more important angles of national and individual economy and efficiency. In this connection, the people of the city are showing a large appreciation of the value of gas for domestic purposes; and the conditions there are interesting because Sheffield, alone (we should imagine) among the large gas undertakings, only commenced last year to instal prepayment meters. Already 2500 have been fixed; orders are on the books for 3600 more; they are being executed at the rate of 200 to 300 per week; and there is no occasion to canvass for more, as they are coming-in at a rate equalling that of the clearance of those already on the books. In every department of gas utilization, good progress was registered last year—particularly in the month of December, when the sales of gas-fires made a record.

There is one other matter. We have heard many comments on the lighting of the city by gas. In fact it has at times been held up as an example of what street lighting should not be. Col. Stephenson does not hide his feelings as to the lighting being, with the improvements effected in lighting appliances, a disgrace to the city. But, as he points out, this is not due to the gas supplied; it is owing to the manner in which the gas is applied. Of course, if obsolete inefficient lamps are used, gas cannot be expected to give its best service, and that is what is happening in Sheffield. It is due to this, too, that in certain other towns gas shows up in street lighting to disadvantage when compared with modern electric lamps, and the disadvantage is accentuated when new lighting contracts are under discussion. A comparison of the old with the new is not fair; and it is a mean trick to attempt to secure the lighting for electricity on such a comparison. We are not saying that is what is being done in Sheffield. The gas-lamps there are obsolete and inefficient; but the magnitude of the work involved in, and the cost of, making a change at a time when the city is pressed with heavy taxation have operated against improvement. There is no doubt that before any alteration is effected, the Corporation Electricity Department will make a bold bid for the work; but we should think there will be two factors to receive special consideration—the relative cost of conversion to modern gas-burners and modern electric lighting; and the relative efficiency for a given expenditure. The Gas Company have already undertaken the conversion of a number of burners at a nominal charge, in order to demonstrate what can be done. But further improvement would be possible by the use of suitable reflectors. Lieut.-Col. Stephenson would like to see the main streets illuminated by high-pressure lamps, and the side streets by improved low-pressure ones. Nothing definite has yet happened in this connection; but as a preliminary to something being done, we are glad to hear that there is a prospect of a Public Lighting Engineer being appointed by the Corporation. If this occurs, we hope that he will be a thoroughly independent and impartial person, and that the Council will be guided by him rather than by those subterranean influences that come from municipal trading in electricity. We have always held that public lighting should be a service quite apart from an electricity supply department, and that it should place its custom just where the maximum effect in economy and efficiency for the purpose is to be obtained—not the "economy" that is claimed when charging the electricity at a price which does not pay.

## Ignored!

THE Institution of Civil Engineers are engaged on what we believe will be some highly valuable work connected with boilers and steam-engines, internal combustion engines (including gas-engines and gas-producers), calorific values of fuels, methods of measurement and the use of instruments, and definitions and values as applicable to units of measurement, &c. That is work in which the organizations of the gas industry are very closely concerned—especially the Institution of Gas Engineers and the Society of British Gas Industries. But not for the first time in matters in which the Institution of Civil Engineers are the prime movers, there seems to be good ground for complaint respecting the ignoring of the gas industry in the composition of the main Committee to which this work has been delegated. The matter arises in connection with the revision of the In-

stitution code for systematizing tests of boilers and steam-engines; and it was thought that this was an opportunity for also establishing a code for internal combustion engines. A Committee has been formed to which eight Institutions have nominated four members each. The eight organizations are: The Institutions of Civil, Mechanical, Electrical Engineers, and Naval Architects, the Institute of Marine Engineers, North-East Coast Institution of Engineers and Shipbuilders, the Institution of Engineers and Shipbuilders in Scotland, and the Institute of Chemistry. There are also upon it representatives of the Electrical and Allied Manufacturers' Association and of the British Engineers' Association. It is said in the information received from the Institution of Civil Engineers that "the membership of the Committee has been carefully chosen, so as to include experts in the various departments of the inquiry, as well as the users and makers of all the various kinds of heat engines." As such care was exercised, how is it the technical organizations of the gas industry are not represented on the main Committee? Perhaps, however, experts from the industry will have the honour of being co-opted by one or more of the sub-committees and panels, into which the main Committee are divided, and which are empowered to co-opt members to obtain advice on any special point. It may be that experts representing the industry will be co-opted on Panel D "Gas-Engines and Gas-Producers;" and Sub-Committee III., on the "Calorific Value of Fuels," may find that their ambit embraces gas, which, it may be known to the members, is now largely sold for gas-engine and other purposes on a heat basis. Another opportunity for voicing the views of the gas industry may be found in the announcement that, in due course, it is proposed to submit various items for discussion to the particular institution or institutions most interested in the item in question. "In this way, it is hoped that the final findings of the Committee will embody the views of all those interested in the testing of heat-engines." All the same, we do not think it unreasonable, in view of the nature of the work of the Committee, to advance the suggestion that the gas industry should have had representation on the main Committee, and to express disappointment that it has in this respect been ignored.

## Analysis of Therm Accounts.

WHERE companies have been operating two years or more on the therm system, there is little reason now to continue the labour of making analysis of their accounts on the volumetric basis. This applies to the analysis which we publish this week of the accounts of the London and four principal Suburban Companies. We are annually indebted for this statistical work and interest to Mr. F. J. Bradfield, the Secretary of the Commercial Gas Company. It will be seen that he has again analyzed the figures on the double basis of per therm and per 1000 c.ft. sold; and, to be perfectly frank, we have lost interest in the latter. Their only value now can be for those who desire to make comparison with the working of the same companies a distance back; but for ascertaining the progress upon the preceding year, the data derived from the analysis on the therm system are a more reliable indication than the cubic feet figures, and are therefore the only ones that matter.

The three Metropolitan Companies last year all made for sale more gaseous therms per ton of coal than in 1922. With 70·22 therms per ton, the Gas Light and Coke Company increased their production per ton by 1·04 therms; with 72·03 therms, the South Metropolitan Company advanced their make per ton by 1·38 therms; and with 70·21 therms, the Commercial Company augmented theirs by 1·14 therms. There were infinitesimal reductions in the coke made for sale per ton of coal by the Gas Light and South Metropolitan Companies; but the Commercial Company showed an increase of 0·12 cwt. In their case the percentage of fuel used was somewhat lower. With 16·63 p.ct. of fuel, the Gas Light Company were about the same; but the South Metropolitan Company with 21·83 p.ct. were up by 0·75 p.ct. The gallons of tar made by the Gas Light and Coke Company were 9·28, or 0·3 gallon less. The South Metropolitan Company in making 9·43 gallons showed an increase of 0·2 gallon; and the Commercial Company in producing 10·07 gallons showed an increase of 0·26 gallon. In view of the increased make of 1·38 therms per ton by the South Metropolitan Company, the facts that the coke for sale was only reduced by 0·1 cwt., that the coke used as fuel was increased by 0·75 p.ct., and that there was an increase of 0·2 gallon in the tar for sale require an Evans to tell us how the figures demonstrate the inter-relation of the thermal values of the gas, coke, and tar. *Primâ facie*, with the higher make of gas, the coke and tar ought to have decreased, if the qualities were the same as in 1922. Of course, no one outside the Company has the necessary factors—the respective calorific values of the coal, coke, and tar—to enable the making of determination.

A gratifying feature is the larger number of therms sold during last year. The Gas Light Company had an increase of 9,338.422 therms, or 5·08 p.ct.; the South Metropolitan Company, 2,716,341 therms, or 3·34 p.ct.; the Commercial Company, 604,441 therms, or 3·54 p.ct. The suburban increase of business was also excellent—Brentford, 8·57 p.ct.; Wandsworth, 5·7 p.ct.; South Suburban, 5·14 p.ct.; and Tottenham, 8·76 p.ct. Location of works has an important effect on the cost of coal per therm. In this respect the analysis shows reductions all along the line; and, generally speaking, the secondary products have produced more, with these results: The net cost of coal per therm in the case of the Gas Light Company was 1·47d. or a reduction of 1·27d. on 1922; South Metropolitan Company, 1·29d., or a reduction of 1·18d.; Commercial Company, 1·37d., or a reduction of 1·14d.; Brentford, 3·25d., or a reduction of 0·89d.; Wandsworth, 2·07d., or a reduction of 1·06d.; South Suburban, 2·94d., or a reduction of 0·61d.; and Tottenham, 2·18d., or a reduction of 1·21d. In order of merit, the South Metropolitan Company come first in the net cost of coal per therm, with 1·29d.; the Commercial next, with 1·37d.; and the Gas Light Company third, with 1·47d. The Suburban Companies' conveyance and delivery expenses are greatly affected by works location, compared with works on the banks of the Thames. We will not penetrate further into Mr. Bradfield's analysis. The statement is full of interesting matter; and from it those who care for statistical investigation as to working and financial results will be able to gratify themselves.

However, just one other point before leaving the data. There is a line which gives the percentage of stoves at rental by the Companies, excepting the South Metropolitan. The percentage for the Gas Light Company is 78; Commercial, 83; Brentford, 96; Wandsworth, 100; South Suburban, 113; and Tottenham, 81. We should like to have a definition of "stoves" in the case of each Company, as practice varies in respect of the goods included in the published data—some only include cookers and fires; others embrace smaller appliances. Being only stoves at rental, the figures do not give any idea as to the actual percentage of gas-heated appliances to consumers; there being such a large number of privately owned ones. It would mean a big thing to take a gas appliance census of London. But the figures quoted above are an indication of the vast field there is for gas-using appliances. Every house with only one gas appliance in it invites individual interest in the work of securing additional custom from it.

### Flat Rate on Coal and Coke Traffic.

It will be remembered that the Mining Association and the National Association of Coke and Bye-Product Plant Owners recently sought the removal of the flat rate of 2d. per ton charged by the railway companies on coal, coke, and patent fuel traffic. The Railway Rates Commission have dismissed the application. The applicants, in submitting their case, contended that the change of circumstances and the action of the railway companies had made the present rates unreasonable and unjust. The Chairman of the Commission (Mr. Clode, K.C.) admitted that the change of circumstances had been largely proved. The Commission, however, found that, in the particular circumstances in which the case was presented, the respondents' proposition—that for the present all industries should bear the flat rate alike—was more reasonable than that one industry should receive exceptional treatment.

### Modern Efficiencies for Rich and Poor Alike.

A gas engineer of large experience wrote to us the other day, pointing out that the gas industry should not treat too lightly the competition of the electrical competitor in the heating field. If there is one respect more than another in which the gas industry is extremely robust, it is in that direction; but in his view our attitude in meeting this competition should be to treat it seriously—not merely to boast of our strength, but to demonstrate a

superior economy and efficiency. In doing this, all the additions to our available resources should be brought to bear. Those additions, he says, have for the most part been made by the manufacturers of cookers, fires, and other gas-heated appliances; and, in his opinion, due recognition should be made of this. Those who want illustration of the diligence and scientific work of our manufacturers in seeking improvement, and in providing appliances rendering better duty, cannot do better than read the address of Mr. H. James Yates at the meeting of Radiation Ltd., as reported in our columns to-day. Not only have they effected many improvements in gas-using appliances, but they are introducing them into the various forms of their productions, so that the poorer classes of users can enjoy equally with the richer classes the progress effected in gas economy and efficiency. All consumers need the best efficiency; of the two the poorer consumer needs the resulting economy more than the richer. It is interesting to learn that the modern forms of cookers have had a demand which "has far exceeded the Company's most sanguine expectations." We have no means of exactly defining "sanguine expectations" when used by Radiation Ltd.; but as the demand has "far exceeded" them, this is sufficient evidence that the gas industry, both at home and across the seas, has a good receptivity for appliances presenting higher thermal and operating efficiencies.

### The Manufacturers' Part at Wembley.

The foregoing reminds us of another matter. It has recently been stated that the electrical manufacturers are taking a liberal part in the provision of appliances for the electrical demonstration at the British Empire Exhibition. The manufacturers of gas-using appliances are doing precisely the same thing, and generously withal. Moreover, through the Society of British Gas Industries, they are substantial subscribers of money; and they have taken their place and are doing their part in the Organizing Committee's work. All this should be known, because it would be a mistake to regard the Wembley Gas Exhibit as a co-operative effort on the part of the gas-supply undertakings alone. The manufacturers are energetic co-operators in this; for they realize that, whether they are makers of gas-using appliances or gas-making or distributing plant, their own progress is contingent on the promotion of the sales of gas.

### Conferences at Wembley.

Throughout the whole period of the British Empire Exhibition, Wembley is to be the scene of a series of highly important conferences. They will be held in the four Congress Halls, which have been specially built for the purpose at the north-east corner of the grounds. The halls (with the committee-rooms) are now practically completed; and they can accommodate respectively 120, 150, 550, and 1800 people. The list of conferences is a long one. From it we learn that the conferences arranged in connection with the gas industry will be held on May 13 and 14, and June 9 and 23. The World Power Conference will be held between June 30 and July 12. The Illuminating Engineering Society are responsible for a conference on Aug. 12.

### The Engineering Exhibits.

As the opening day of the exhibition draws near, the different sections begin to present some outline of their future appearance. Within the completed Palace of Engineering, the marking-out of floor space has given place to the erection of stands. Huge packing cases swing from the giant cranes; and the sound of hammering echoes and re-echoes. In no Section is greater activity being displayed than in the Shipbuilding, Mechanical, and General Engineering Section, which, under the organization of the British Engineers' Association, has already overflown its banks into the Land Transport Section, and threatens every square foot of unoccupied stand space within this vast Palace of Engineering. Provisional space application forms were sent out on June 22, 1923, and applications received were confirmed some six months later. By the end of the year, the whole of the floor space in the section was let; but the volume of applications still arriving necessitated the acquisition of further territory, and some 4300 sq. ft. were taken up in the Land Transport Section. The last foot of this ground was quickly disposed of. No fewer than 406 firms will display their products for the whole world to see in 278 stands of simple but dignified design, covering some 140,000 sq. ft. of floor space. On Oct. 15 last year, the British Engineers' Association Resident Engineer at Wembley was appointed, and proceeded to mark out the stand spaces, and to make full provision for gas light, power, and water, all of which are required in varying degree by each exhibitor. From that time, exhibitors have been able to proceed with the erection of their stands, digging of foundations for, and erection of, heavy plant and machinery, and with the proper and effective arrangement of their products, which, within a few short weeks, will be displayed to an admiring world.

## PERSONAL.

At a meeting on the 4th inst., Mr. JOHN PETTY LEATHER, of Burnley, and Mr. SAMUEL TAGG, of Preston, were elected members of the Institution of Civil Engineers.

The Burnley Gas Committee have appointed as Deputy Gas Engineer, Mr. FREDERICK NORMAN HOWES, who is at present engaged as Deputy Chief of the Engineering Inspection Department of the South Metropolitan Gas Company. Prior to this he was at Doncaster.

Mr. CHARLES H. CARDER, Engineer and General Manager of the Oldbury Gas Department, has been appointed Chief Gas Engineer at Rio de Janeiro, and leaves England very shortly to take up his duties there. A man of wide experience in both constructional and administrative branches, Mr. Carder is probably best known outside the Midland area by the excellent work he did in the organization of the Federation of Gas Employers. In accepting his resignation, the Oldbury Council have voted him an honorarium of £100 in respect of special services in the reconstruction of the works during the past two years.

## OBITUARY.

### WILLIAM ALBERT PADFIELD.

WE are sorry to have to announce that the late Mr. Thomas Settle has not been long survived by his collaborator in connection with the invention of the Settle-Padfield vertical retort. Mr. W. A. Padfield died at Exeter on Monday of last week, aged 81.

Mr. Padfield was born in 1843, and upon completing his school education was articled to Messrs. E. Cockey and Sons, of Frome. While with this firm, he held the post of Assistant Engineer to the Frome Gas Company, of which the late Mr. Henry Cockey was for many years the Engineer. Later Mr. Padfield became Secretary and Engineer of the High Wycombe Gas Company, leaving there in 1872, when he was appointed Secretary and Manager of the Exeter Gas Light Company. On leaving High Wycombe he was presented by the Directors with a handsome testimonial in recognition of his abilities and of their appreciation of his work. In 1882, Mr. Sidney E. Stevenson resigned his position as Engineer to the Exeter Gas Company, and from that time Mr. Padfield became responsible for the working of the whole undertaking, which proved uniformly successful. Under his supervision the works were entirely remodelled and brought up to date. When Mr. Padfield retired from the position of Engineer, Manager, and Secretary, he was succeeded by Mr. W. N. Westlake, and was appointed a Director of the Company.

Mr. Padfield had considerable parliamentary experience, having, for instance, been called upon at different times to give evidence in the Committee Rooms, in connection with Private Bills, on behalf of the Exeter Gas Company, the Exmouth Gas Company, and the Basingstoke Gas Company. He was Chairman of Messrs. E. Cockey and Sons, Ltd., for seven years, and left the firm (for which he had worked hard) in a very satisfactory condition. His many other activities included a Directorship of the Budleigh Salterton Gas Company. He was President of the South-West District Association of Gas Managers in 1887. In 1870 he joined the British Association of Gas Managers, subsequently passing into the Gas Institute, and then into the Institution of Gas Engineers.

Mr. JOHN CHARLES PENNINGTON, whose death has occurred at the age of 72 years, had been one of the most renowned cricketers that Elland has possessed. In the gas industry he was known as Manager of the Colwyn Bay Gas-Works, to which position he was appointed in 1897.

It is with regret that we have to announce the death of Mrs. Kendrick, wife of Mr. C. A. KENDRICK, of the Welsbach Light Company, Ltd., Welsbach House, Gray's Inn Road, W.C. Mrs. Kendrick passed away on Tuesday, the 11th inst. Owing to his sad bereavement, Mr. Kendrick will not resume business for the next two weeks.

We regret to announce that Mr. W. BURGIN, the London Manager of the Stanton Ironworks Company, Ltd., near Nottingham, died suddenly on Sunday, March 9, in a nursing home, at the age of 50. Mr. Burgin had been for the last twenty years in the services of the Stanton and previously the Holwell Companies, and we feel sure his services will be much missed by the former Company, as will his personality by numerous friends in the industry.

# ELECTRICITY SUPPLY MEMORANDA.

THE gas industry is not oblivious to the intensified campaign that is being waged in some electricity supply areas to secure a cooking load for the electrical stations. We rather think that many men in the gas industry regard this as something advantageous, as it will sharpen-up those concerns that instal gas-cookers, and trust to the tender mercies of the culinary operators to use them efficiently, and to maintain them in proper condition. That never was a good policy, and never will be, despite the cheapness of the gas therm compared with an electric therm, and despite the range of work accomplished on a gas cooker compared with that which can be done—only with money and time inefficiency—on an electric cooker. Another thing which the competition will do will be to induce gas undertakings, when renovating cookers, to modernize them in more ways than one. The load, being largely a day demand, is a good one as much for a gas undertaking as for an electricity concern; and the higher the over-all efficiency throughout a district, the greater the resisting force to competition. The gas industry has much for which to thank those manufacturers who have by modern improvements raised the efficiency of the gas-cooker.

**The Cooking Campaign.**

**Hidden Points.**

One of the noticeable features about recent deliverances to stimulate interest in electric cooking is the obvious evasion of part of the tale. We have had information from more than one quarter, where there has been installation of a small number (comparatively with gas cookers) of electric cookers, of these being of small size, and of many being supplemented with gas-boiling rings. There are cases, too, where electric cookers have been installed and the gas ones are still retained; and it has been observed that in these cases the quarterly consumption of gas is gradually returning to its former dimensions, which eloquently tells a tale. The electricians may shout as much as they please about the economy and efficiency of the electric cooker; but just as more cannot be got out of a pint pot than is put into it, so no more work can be realized from an electric cooker than the amount of energy input is capable of performing at well-known efficiencies—and the cost must correspond to the work done and the consumption of current. Another thing is that as time passes the users of these cookers will learn more and more of their deficiencies and of their element deterioration and incidental troubles. The two together—the cost of current and upkeep—as compared with the simplicity and efficiency of gas-cooking appliances, will soon tell in favour of gas. There are districts where experience with electric cooking has been a bad advertisement for it. Much noise, too, has been made over a few restaurants that have been fitted up entirely with electrical appliances—more noise than the gas industry makes over gas being used at Wembley for catering for the millions of people who will visit the great exhibition. But we know of places where these restaurants have been converted wholly or for the most part back to gas. The capital expenditure having been incurred, this is not due to any whim, but to sheer necessity. In these cases the electricity people have tended the appliances with scrupulous care, in order to prevent (if possible) any return to gas. We know of one town where there was great electrical enthusiasm over a single electric cooker which was installed in an hotel. So far as can be learned, no other hotel in that town has followed the example; and after a few months nothing more was heard of this lonely hotel experiment. In another large establishment of which we know, the electric equipment is still in use—well looked after by an electrical man on the premises; but he is positively thankful that he does not have to show the administrative authority a detailed statement of his cooking installation maintenance expenses. They are included among other engineering jobs on the large premises. Notwithstanding all such experience, the gas industry must not, through indolence, allow progress to be made in this direction. The industry has ample resources. In the face of competition, the best possible use should be made of them.

**Is Truth a Disqualification?**

Can a man who tells the truth and does not indulge in evasion be a member of an Electricity Committee? As to whether these are electrically considered good qualifications we have a certain amount of doubt, after reading some comments by "Meteor" of the "Electrical Times." He was dealing with certain remarks made at a meeting of the Shoreditch Guardians when the question of installing electric radiators in the operating theatre was under consideration. Two of the members are also members of the Shoreditch Electric Lighting Committee; one of them (Alderman P. Kelleher) being the Chairman. The other member is the Rev. E. Digby. Both these gentlemen expressed their opinions frankly as to electric radiators. "Electricity," said the Alderman, "is the last thing I should use for heating purposes." A further remark was: "I have tried electricity for certain things, and found it too expensive." An observation which also gives offence to "Meteor"—this from the Rev. Mr. Digby—was: "You know they [electric radiators] eat money. . . . I oppose it because I have had experience of electric heating." Does "Meteor" really think the reverend gentleman, having had experience, would wilfully tell a lie. Our journalistic friend says he would rather like to hear from these members; and he asks two questions: "Do they propose to carry on as members of the Electric Lighting Committee? If so, with what object?" "Meteor" does not suggest they were not telling the truth; but apparently he is doubtful as to whether they are competent to be members of the Committee. We wish our friend would explain why.

**Not "Ideal" Electrically.**

Homes are not ideal which are uneconomical through the introduction of expensive means of operation—expensive to instal, to operate, and to maintain. Domestic electrical operation (other than for lighting) is not plentifully illustrated at the Ideal Home Exhibition. Our electrical contemporaries are disappointed. The "Electrical Times," the "Electrician," and the "Review" had all been encouraging the hope that more than ever what is electrical would have been seen there; but they have found less. It is supposed that Wembley is the cause of the shortage; but there is a significant statement in the "Electrician" to the effect that many electrical firms who exhibited last year, and still more of those who exhibited two years ago, are not represented. This suggests that the dwindling is a progressive feature, and that it is due to the fact that the firms concerned have not found the trade-promoting value in the exhibition for which they had looked. It is too much to expect them to go on exhibiting indefinitely, and at heavy expense, without reaping some substantial reward. And we know that domestic electrically heated appliances have not an extensive market. With the exhibits that are there, our electrical contemporaries are not well pleased. According to the "Review," some of the firms "seem to content themselves with presenting an agglomeration of appliances which suggest a nightmare in nickel finish; others fly to the other extreme, but very few strike the happy medium of few but effective exhibits, with common sense demonstrations." It is favourable to a co-operative display at such an exhibition. While the "Electrician" does not suggest that every firm manufacturing domestic electric appliances should have been represented on this occasion, it does think that "advantage might have been taken, in subtle ways, of the chance of educating the public as to how electricity can save labour in the house." We like the "subtle ways;" there is something beautifully candid about it. Evidently our contemporary has a notion that this might have been done in the examples of ideal houses that have been constructed as object-lessons in the art of home planning. It bemoans the fact that there is nothing of the kind in those houses—nothing electrical but the lighting. And the "Review" says that the lack of electrical methods in such model dwellings has left it with the conviction that the Ideal Home Exhibition is not an exhibition of ideal homes. The contrary may be the truth, in view of our former remark that uneconomical operation is not ideal. The "Electrical Times" also frankly asserts that among the actual exhibits there is little real new apparatus, as distinct from modified patterns. There has been noticed with interest the extent to which gas undertakings are adopting bowl fittings. The variable electric lighting of the stands is also the subject of stricture. "Some of them," remarks the "Electrician," "are extraordinarily badly lighted. There is, for instance, one not very large stand which is illuminated (?) by twelve high-power gas-filled lamps which are not shaded in any way." It adds "the exhibition authorities ought to prevent that sort of thing." It is high time that some electrical firms were electrically educated.

**Propaganda among the Brotherhood.**

The length to which electrical propaganda is being carried is illustrated by the Mayoress of Hackney (Alderman Mrs. Hammer) addressing a Brotherhood Meeting at the Rectory Road Congregational Church on Sunday afternoon, Feb. 24. Neither the day nor the occasion appeals to us as being highly appropriate; but Hackney has its own special ways of dealing with electrical affairs, and of seeking the conversion of people from the (according to electrical belief) error of their gas patronage to the greater error of electrical patronage for domestic heating purposes. Not that the Mayoress, so far as the report before us gives information, attacked gas; but her picture of the wonderful things that electricity can do gave no place for any rival in the field. However, we learn that in the near future Hackney will have big showrooms, where it is intended to preach, teach, and repeat again and again the gospel of electricity. This should help to brighten up the borough if it does nothing else; but it looks as though the Mayoress is impressed with the fact that it will take a lot of preaching and teaching to imbue people with the value of electricity, and especially to be lavish with it. It has, according to the Mayoress, taken a long time to teach men to be lavish with water; and she is afraid it will take a long time for them to learn to be lavish with electricity. The costs of the two are not comparable; and the Mayoress ought to know that the depths of pockets are limited. However, it is interesting to learn that electricity is going to revolutionize social service. It is going to change our work, our home life, and even the character of the service received from the physician. Further, every woman who does without coal fires and the chimney will help to make life healthier. True; but every woman who does this the gas way, and not the electrical, will do something to save her own pocket, the coal resources of the nation, and products that are

essential to the industrial well-being of the country. But Mrs. Hammer also says electricity will relieve the mother and housewife of the load of domestic work. It cannot do more than gas has done, and is doing. The uneconomy of electricity for heating operations—uneconomy in money and time—would be sufficient to cast new burdens upon her. But the Mayoress of Hackney thinks electricity will provide the housewife with a new heart outside her body—a new energy and a new power. It is all very wonderful—as presented; but, as we read week by week the contributions to this subject, it is equally wonderful how thick is the incrustation of electrical pretence. There is something very real about the uneconomy and inefficiency of electricity for domestic heating purposes; but the Mayoress says "electricity and its social service add one more stone to the eternally growing edifice of human brotherhood." Only one more "stone!" That is modest when compared with what preceded.

**Industry and Stoppages of Supply.**

The traders and manufacturers of Leicester are very much annoyed over the losses sustained through a recent failure of the electricity supply. When factories rely on a power agent given to capricious habits, they must expect that it will play tricks upon them at inopportune times. Short though the recent failure was at Leicester, many workpeople were sent home from the factories, and thus time was lost to the manufacturers and wages to the employees. The manufacturers consider that there ought to be some means by which the Electricity Department, when a stoppage of supply occurs, could inform them how long it was likely to continue. It is understood that it has been arranged that on a failure happening the Secretary to the Chamber of Commerce shall be notified immediately by the Department as to the probable duration. When the information is "broadcasted" by the Secretary, the manufacturers will know whether or not they had better send their workpeople home.

**Electrical Prospectuses.**

The writer of "Electric Supply Memoranda" is a shareholder in certain gas companies. This is fortunate in one respect; but, through it, he is now being constantly worried with the prospectuses issued by certain promoters of electricity concerns—one with a very big name, an enormous capacity for capital, but little to show for it. "The Warwickshire and South Midland Electricity Supply Corporation, Limited," looks well in print; but they have no power to supply Warwickshire and the South Midlands with electricity. There are a few other suppliers in the area—Birmingham for example. The "Corporation" have contracted to purchase a controlling share and debenture interest in the Barford Electric Supply Company, Ltd., and some people have been unsuccessfully searching for Barford in the "A.B.C." This precious "Corporation" sent out a prospectus dated Jan. 2 last; and now several copies of the same document, dated March 10, have reached the writer. But in the Jan. 2 prospectus, the "Corporation" invited the public to subscribe 12,000 8 p.ct. cumulative preference shares of £1 each at par (income-tax free up to 4s. 6d. in the pound), and 12,000 7 p.ct. (guaranteed) first mortgage debentures at £98 p.ct. in multiples of £10 each. Manifestly the first offer did not net all the money required; for the "balance" of the "authorized" capital is now offered in a somewhat different form. The public are to-day invited to subscribe for: 4630 8 p.ct. cumulative preference shares of £1 each at par (income-tax free up to 4s. 6d. in the pound), 9498 ordinary shares at the price of 5s. per share, and 402 7 p.ct. (guaranteed) first mortgage debentures at 98 p.ct., in multiples of £10 each. Some of those associated with the Warwickshire Corporation are connected with the Wareham Electric Supply Company, Ltd. In both the Electricity Finance and Distribution Corporation, Ltd., are concerned; and the name of Eaton appeared among others on the Wareham prospectus!

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**Poplar Works Visit.**—We are asked by Mr. Leonard Lacey, the Hon. Secretary of the London and Southern District Junior Gas Association, to mention that the date of the visit of the members to the Poplar Works of the Commercial Gas Company has been altered from Saturday, April 12, to Saturday, April 5.

**Midland Junior Gas Association.**—At a meeting to be held in the Council House, Birmingham, on Thursday, March 20, at 6.15, papers will be read by Mr. H. Wynne (Burton-on-Trent) on "Depositions in Mains," and by Mr. G. Ball (late Chief Mains Inspector, Birmingham) entitled "Practical Hints on Main and Service Laying." On April 5 there is to be a visit to the works of Messrs. Herbert Morris, Ltd., and to the Technical College, Loughborough.

**Cleansing the Air.**—The current issue of "Garden Cities and Town Planning" is a special light and air number, and contains articles on smoke abatement and smokeless fuels. In the former Marion Fitzgerald (who is joint author of "The Smokeless City") points to the harm done to human life, vegetation, and buildings by the burning of raw coal. It is mentioned that the extra cost of lighting the City of Manchester during a foggy day in January, 1922, was no less than £4265. The writer of the article on smokeless fuels states that it is in the scientific treatment of coal at gas-works that the solution of smoke and fuel problems must be sought.

## NATIONAL GAS COUNCIL.

### Central Executive Board.

The Central Executive Board of the National Gas Council held their usual monthly meeting at No. 30, Grosvenor Gardens, S.W., on Tuesday, March 11. Mr. D. Milne Watson (the President) was in the chair.

#### Coal Stocks.

It was reported that, in accordance with the decision reached at the last meeting, representations had been made to the Mining Association regarding the necessity for making good the stocks of coal at gas-works and maintaining deliveries in accordance with contract quantities.

#### The North Metropolitan Electric Power Supply Bill.

It was stated that a petition has been lodged by the Council's Parliamentary Agents against this Bill, which would, *inter alia*, have empowered the promoters to construct transformer stations under streets to the prejudice of gas undertakings by making access to existing mains very difficult, and rendering the laying of new mains more expensive, if not actually impossible. It was reported that the agents for the Bill had since notified their intention to strike out the objectionable clause.

#### Mains of Insufficient Capacity.

Further conferences at the Board of Trade were reported in regard to an application for an Order under section 10 of the Gas Regulation Act by an urban district council, and representations of the railway companies with regard to the question of mains of insufficient capacity, with a view to arriving at an agreed clause with the railway companies; and it was stated that negotiations were still in progress. An early meeting with the railway companies was being arranged, when it was hoped that a final settlement would be reached in the matter.

#### Royal Commission on Mining Subsidence.

Mr. T. P. Ridley (Newcastle-on-Tyne and Gateshead Gas Company) was appointed to give evidence on behalf of the Council before the Royal Commission. It was stated that the evidence of the gas industry would probably be heard on Wednesday, March 19.

#### Diversion of Highways.

A Joint Conference was reported to have taken place on Feb. 15 between representatives of the British Waterworks Association, the Water Companies' Association, the Incorporated Municipal Electrical Association, the Gas Companies' Protection Association, and the National Gas Council, with a view to joint action for the protection of the undertakings represented by such Associations in connection with the removal of mains and cables occasioned by road diversions and improvements.

A resolution was passed at the Conference, and is now the subject of consideration by the various Associations represented.

#### Standard Cookers.

It was reported that the Council had now completed agreements with certain cooker manufacturers for the supply of the Council's "Standard" cookers, and that applications from a number of other firms were receiving immediate attention.

It appeared that some districts were proposing to place orders for bulk supplies with the makers, so that it is advisable for would-be purchasers to make early application.

#### British Engineering Standards Association.

Mr. F. W. Goodenough was appointed to represent the Council on a Sectional Committee on Illumination, under the chairmanship of Colonel Kenelm Edgcumbe (Institution of Electrical Engineers), which has been set up by the British Engineering Standards Association "to consider the subject of Standards in the Illumination Industry."

#### World Power Conference.

A list was read of the authors and subjects of the papers which will be read at the Gas and Fuel Section of the World Power Conference on July 4 and 7.

#### Annual Meeting of the National Gas Council.

It was agreed that the Annual Meeting of the Council, instead of being held in June as usual, should be held on July 8 this year, so as to give representatives from the provinces an opportunity of attending the meetings of the Gas and Fuel Section of the World Power Conference.

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**North of England Gas Managers' Association.**—We learn from the Hon. Secretary and Treasurer (Mr. Norman S. Cox, Gas Offices, Sunderland) that the annual general meeting of the Association will be held at Newcastle on Friday, May 2, under the Presidency of Mr. J. Kelly, of Bridlington.

**Books Received.**—Two new publications have reached us for review. One is by G. Lunge and C. A. Keene, entitled "Technical Methods of Chemical Analysis," and is published by Gurney and Jackson. The other is "Low-Temperature Carbonization," by S. N. Wellington and W. R. Cooper. The latter volume is published by Messrs. Charles Griffin & Co. Reviews of these will shortly appear in our columns.

# THE PRESENT POSITION OF THE GAS INDUSTRY.

By A Gas Engineer.

[With the opinions expressed in this series of articles, the Editor of the "Journal" does not necessarily associate himself.]

### Introductory Remarks.

This is the first of a series of articles which is intended to examine the present position of the gas industry, more particularly as regards organization and the distribution department. The articles are intended to promote discussion; and the author, who has spent many years in the service of the industry, will probably make statements with which other people will disagree, and will enunciate a policy or policies which will not meet with universal approval. At any rate the articles are written in good faith, and with the intention of proving that vital alterations must be made in the methods of carrying on business if the gas industry is to maintain its present position as one of the greatest industries of the world.

It is beyond dispute that it is one of the vital industries of this country; and that it has long been recognized as such is proved by the fact that Parliament has conferred upon it certain powers, monopolies, and responsibilities, combined with certain restrictions as regards finance and the quality of the article it mainly sells. All monopolies have the weakness that they place the recipient in somewhat the same position as the remittance man who, having a definite minimum income, has lost to some extent the inducements which have made others work and rise to prosperity and power. The number of managers to whom the last statement applies is infinitesimal, for the majority of them are young men with modern ideas. There is, however, still a large number of provincial boards of directors who, having without special effort seen the normal dividend earned each half-year, view with distrust and almost dismay any proposal which upsets old methods and which would involve expenditure from which no immediate return is obvious. There is much to be said for the plan that a certain proportion of the directors should retire at fixed intervals and not be eligible for re-election. The adoption of some such proposal would certainly mean that a much livelier interest would be taken by the shareholders; and the little family groups and friendly cliques which now, in many cases, form the boards of directors would either be broken up or made much more difficult to maintain. Many good men are kept off boards for years, if not altogether, because they are not acceptable, for personal reasons, to the existing directors. Other advantages of some such scheme would be the abolition of the director who is too old properly to fulfil his duties, but whose many years of useful service make it difficult for his colleagues to suggest his resignation. It would at the same time limit the amount of harm that what you might call the "petty-cash" director can do. The petty-cash director can best be likened to the abnormally long-sighted man whose sight in his youth is a great asset, but which, as he grows older, becomes a deformity. When you get a board of directors the majority of whom have the petty-cash instinct, you can say good-bye to any real progress, more particularly in the distribution department.

The remainder of the articles will deal exclusively with the distribution side of the industry; but it is necessary first to consider a few points dealing with the policy of management as a whole. Owing to the operation of the Gas Regulation Act, the gas industry is just as much living now in the glow of a false prosperity as during the war it lived under the cloud of financial disaster. Both conditions are, or were, purely temporary, as the latter was removed by the Gas Regulation Act, and the former may at any time be removed by the operation of the clause in the Act which allows for a revision of the standard price after a period of two years. All companies delay as long as possible their application to Parliament for further powers, owing to the waste of time involved and the high cost incurred. Most of the procedure which has grown up round these applications is totally unnecessary, and could be very much simplified without endangering the interests of either gas consumers or local authorities. It might safely be said that in the majority of cases the opposition is purely factitious, and that local authorities, railway companies, &c., always oppose on principle, thus unnecessarily increasing the cost of obtaining the Act, and so doing an injury both to the shareholders of the company and to the consumers.

The Gas Regulation Act was an attempt to simplify matters; but though well conceived, like all war and post-war legislation, it was carried out in haste, and is full of faults. The principle worked upon in fixing a new standard price of gas was wrong inasmuch as the method of arriving at that new price was to add the extra cost of manufacture due to the war to the pre-war costs in the case of each individual company. This benefited the companies who had not worked economically in pre-war times to a much greater extent than those who had. The complicated schedule which had to be filled up in connection with the Act was a premium upon ingenuity. The minimum pressure was ridiculous, and the testing clauses have degenerated to a farce in a great number of cases, owing to the Gas Referees' instructions and also the type of examiner who has been entrusted with the work. It is apparently no uncommon thing for a borough surveyor to be appointed to the position. A borough surveyor usually has enough to do to look after his own business, without being entrusted with work for which neither his training nor his subsequent experience has fitted him.

It should surely not be beyond the wit of the leaders in the industry to devise a scheme for a universal Act which could be made to apply to all gas undertakings in the country. The different conditions under which individual companies work can be divided into the following heads:

1. Size of undertaking.
2. Distance from coalfields.
3. Character of distribution area.

As far as the standard price is concerned (which is, after all, far the most important thing about any Gas Act) there should be little difficulty in fixing a basic standard price with a scale varying it according to the size of the undertaking. The distance of the works from the coalfields is not really so important as is generally assumed to be the case, for, if the price of coal is high owing to this, the price of coke and tar is correspondingly high also, and on the balance there is not much in it. The size and character of the distribution area seems on the face of it to present much more difficulty, but it certainly should not be impossible to overcome this—possibly by means of a scale based on the consumption of gas per mile of main.

This is not the occasion to elaborate this subject, but if a General Act could be evolved it would be of immense benefit to the industry at large as well as bringing a saving to gas consumers and ratepayers generally.

As far as these articles are concerned, it is only intended to touch very briefly upon the manufacturing side, for in a generation the progressive men in the industry, with the aid of the great gas-works contractors, have revolutionized the manufacture of gas and are rapidly approaching main principles upon which it will be difficult to improve. What is wanted from those in charge of the manufacture of gas is an article of good and regular quality, of high purity, and at as low a price as possible. To the maker of gas, a water-gas plant has the supreme advantage of flexibility; but the ease with which it can be used to meet variations in consumption is the cause of many of the distributor's difficulties, and, apart from the financial loss, is certainly one of the reasons why gas has such a bad name in certain areas. Except in the case of real emergency, the percentage of water gas sent out should vary but very little not only from day to day, but from month to month. In some undertakings, within the course of a week the percentage will vary from nothing to as much as 40 p.ct., and, worse still, it will vary from hour to hour. The impurities in the gas which are prohibited by Act of Parliament are, of course, except through accident, always absent; but surely the time has arrived when the other impurities could be reduced, if not entirely eliminated. They are a cause of much trouble to the users of gas, and undoubtedly tend to decrease the consumption for lighting purposes.

While so much has been done in recent times to improve the distribution side of the industry, it may seem ungracious to embark on a series of articles such as these, which must necessarily to a great extent consist of criticism. However, the author is convinced that many concerns are not reaping the full benefits for the efforts put forth, and will not do so until complete and fully co-ordinated schemes are considered and adopted. The secret of success is co-ordination between the British Commercial Gas Association, the executive heads of the individual undertakings, the manufacturers of gas-apparatus, and the Technical Press. Then comes systematic hard work, often by those who cannot hope to reap the full reward of their labours, but must be satisfied with the assurance that their successors will benefit thereby.

"After me cometh a builder;
Tell him I too have known."

## Gas for Making Metallic Packing.

The United States Metallic Packing Company, of Philadelphia, have, it is stated, found gas heating a strong factor in obtaining a better product—reducing waste and operating time, and generally leading to better business. When hemp or rope packing was no longer strong enough for use with increasing steam pressures and temperatures, white-metal packing was substituted, and this later gave place to a combination of copper and lead in about equal proportions. This alloy is what is now being produced in Philadelphia for world consumption. Melting the copper and lead to make the packing is a delicate operation. The heat has to be just right, and subject to absolute control; and that such a requirement is admirably met with gas, the manufacturers have learned from experience. Formerly the melting was "farmed out" to foundries using fuels other than gas, the result being such lack of uniformity that from 20 to 40 p.ct. of the material had to be rejected. Now, with their own foundry, rejections run to from 8 to 10 p.ct., and gas equipment has helped to make the difference. A dozen "Maxon" brass-melting furnaces have already been installed, each operating on an average consumption of 550 c.ft. of gas per 100 lbs. of metal melted. The output has run as high as 240,000 lbs. of metal a month, and the gas requirements make the firm an excellent customer to the Gas Company. In 1920 the consumption amounted to 1,222,200 c.ft.; in 1921 to 6,144,600 c.ft.; in 1922, to 10,748,500 c.ft.; while for the first five months in 1923 it was 8,310,700 c.ft.

## A RECORDING CALORIMETER OF FRENCH DESIGN.

A new type of calorimeter for determining automatically the calorific power of gaseous fuel has been introduced into France. Its simplicity, robustness, compact character, and numerous applications have obtained for it a favourable reception in the gas industry. The Société du Gaz de Paris have taken a keen interest in this addition to gas-testing devices, and have suggested certain modifications, which have been carried out. The new calorimeter is a more perfect realization of the idea embodied in the well-known Junkers apparatus. The "Calorimètre Enregistreur Automatique"* eliminates all the readings and calculations necessary with the Junkers type. As a consequence, possibility of error due to the personal element is eliminated. The principle it applies is expressed in the formula: $C = \frac{V \times dT}{G}$, C being the calorific power sought, V the volume of the water, G the volume of the gas burned, and $dT$ the difference of temperature indicated by a millivoltmeter. The expression $\frac{V}{G}$ being constant, a proportionality is established between the calorific power and the difference of temperature ascertained.

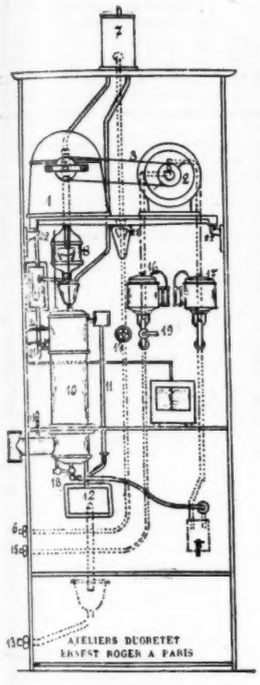


Fig. 2.—1, Water meter; 7, constant supply reservoir; 2, gas-meter; 16 and 17, regulators of admission and exit of gas; 10, calorimeter; 18, burner; 9, compensation reservoir.

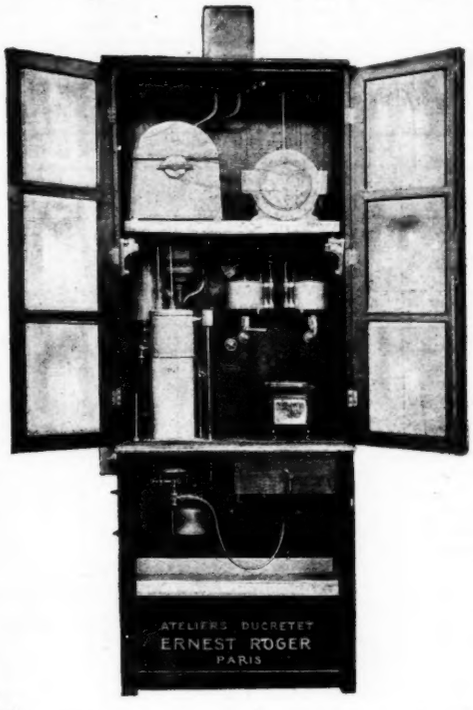


Fig. 1.—The Automatic Calorimeter.

The principal parts of the automatic calorimeter are: An ordinary calorimeter; governors regulating the admission of the water and the entry and exit of the gas; a gas-meter; a water meter; a compensating reservoir; an electric device for measuring the difference of temperature; four thermometers (two for controlling the temperature of the water and two for the gas); a gas-burner; and a millivoltmeter. Fig. 1 shows the general appearance of the apparatus, and fig. 2 is a section. The gas and water meters are coupled by a chain turning on two toothed wheels, each mounted on the axis of the respective meters. A constant regulation is thus maintained between the two volumes of water and the gas consumed.

The water, after passing into the meter, and through a governor, enters the calorimeter, where it is heated by contact with a tubular group subjected to the action of the products of combustion. The rise in temperature of the current acts on a thermo-electric couple, one of the elements of which is in circuit with the cold water at its entry into the calorimeter, and the other with the hot water before it leaves the tubular body. The difference of potential thus created is registered by the millivoltmeter. The deviation of the needle of the galvanometer is rigorously proportionate to the difference of temperature of the cold and hot currents.

The mechanical connection of the meters having rendered constant the ratio $\frac{V}{G}$, the calorific power of C becomes directly proportional to the difference of temperature ($dT$) and, as a consequence, to the indications of the millivoltmeter. The apparatus has a dial with a registering device; and a diagram sheet, ruled for 24 hours and rolled on a drum, turns regularly. A needle moving on the face of the dial, which is divided into 25 millivolts, points to a given figure on the diagram; the latter, being graduated in calories, gives immediately the required calorific power. The margin of possible inaccuracy is less than 0·5 p.ct. The millivoltmeter can be separated from the calorimeter and placed in the engineer's office, provided that the distance between the galvanometer and the calorimeter, and the resistance of the connecting wire, are taken into account. The daily diagrams, being separate documents, can be filed for reference, thus assuring a permanent check on the calorific value of the gas produced, and a continuous supervision of the working of the plant. The inventor recommends that the gas should be purified before its admission to the calorimeter, that the latter should not be exposed to vibration, and that it should be protected from exterior influences. The calorimeters are now supplied with the improvements realized on the suggestions of the Société du Gaz de Paris. These include the combustion of the gas in an enclosure saturated with water, a safety device for cutting off the gas in case of failure of the water supply, and means for reducing the indications of the millivoltmeter to N.T.P. So far it has proved itself an admirable instrument of control.

* The "Calorimètre Enregistreur Automatique" is constructed by the Ateliers Ducretet (Ernest Roger), No. 75, Rue Claude-Bernard, Paris.

## CHIEF INSPECTOR OF GAS-METERS FOR MANCHESTER.

### Retirement of, and Presentation to, Mr. S. Dyson.

During a meeting of the Council of the Association of Statutory Gas-Meter Inspectors, held on March 13, at the Gas-Meter Testing Office, London Road, Manchester, it was announced that the Vice-Chairman of the Council, Mr. S. Dyson, having reached the age of retirement, would shortly be relinquishing his position as Chief Inspector of Gas-Meters for the City of Manchester.

At a luncheon after the morning session, Mr. H. N. Barrow, J.P. (the Chairman of the Manchester Justices Gas-Meter Testing Committee), in a few well-chosen words, proposed the health of Mr. Dyson, wishing him a very happy and peaceful retirement. Mr. Barrow mentioned that Mr. Dyson had occupied the position of Chief Inspector of the Manchester office for over thirty years, and during that time had enjoyed the confidence of his Committee. He had been most industrious and active in his endeavours to increase the efficiency of gas-meter testing; and as a mark of their appreciation the Justices Committee were presenting Mr. Dyson with an illuminated address.

Mr. Hume (City of London), Chairman of the Council, in supporting the toast, stated that, while they regretted they would be deprived of the benefit of Mr. Dyson's counsel and assistance at their meetings, their sincere wish was that he would be spared for many years to enjoy his much-deserved rest.

Mr. S. B. Langlands (Glasgow) also supported the toast, and remarked that the splendidly equipped testing station at Manchester would remain as a monument of Mr. Dyson's work in his efforts to raise gas-meter testing to its present high level.

Mr. Dyson, replying, referred to the vast changes, both in the number of meters passing through the office and the various new types which had been introduced since he first became Chief Inspector of the Manchester office. He was proud of the fact that many former members of his staff were now inspectors in various parts of the country; and he would take leave of his colleagues hoping they would maintain the standard of efficiency and high sense of duty which he had always endeavoured to keep in view.

**Industrial Field on the Pacific Coast.**—The Commercial Committee of the Pacific Coast Gas Association propose to make a thorough canvass of the industrial field, in order to ascertain the essentials involved in each class of load. Eventually the results of the investigation will be incorporated in book form. It is thought by the Association that, in view of the general utilization of gas, something should be done to protect the public against the purchase of inferior appliances and their installation without regard to safety or sanitary conditions. Among numerous other activities, the Association have been considering the question of publicity. They have requested the Publicity Committee to prepare a plan of campaign that shall have for its purpose the creating in the minds of dealers, as well as of the general community, a proper appreciation of the value of gas as a fuel.

# COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

## STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER 1000 C.FT. SOLD IN THE YEAR 1923.

**Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.**

| | Gas Light and Coke. | South Metropolitan. | Commercial. | Wandsworth. | South Suburban. | Tottenham. | Brentford. |
|---|---|---|---|---|---|---|---|
| Gas sold . . . . . thousands | 33,411,955 | 15,010,233 | 3,717,593 | 3,007,970 | 3,125,918 | 2,682,642 | 4,920,873 |
| Gas made per ton of coal carbonized. cubic feet | 12,919 | 12,863 | 13,870 | 14,637 | 12,147 | 13,822 | .. |
| Gas unaccounted for . . . . . per cent. | 7·20 | 3·72 | 7·97 | 7·26 | 7·08 | 7·94 | 5·97 |
| Coke made for sale per ton of coal . cwt. | 10·73 | 9·60 | 11·48 | 10·40 | 10·11 | 8 70 | 10·52 |
| Tar made per ton of coal. . . . . gallons. | 9 28 | 9·43 | 10·07 | 8·54 | 9 86 | 9·48 | 10·10 |
| Liquor made per ton of coal . . gallons, 8 oz. | 35·91 | 41·12 | 39·55 | 37·10 | 34·08 | 35·32 | 36·09 |
| Percentage of coke used as fuel . . . . . | 16·63 | 21·83 | 14·97 | 16·80 | 20·94 | 26·79 | 15·90 |
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| Capital expended per 1000 cubic feet sold . . . | 8 11·94 | 7 10·33 | 8 1·65 | 8 2·12 | 9 6·05 | 9 11·25 | 8 1·37 |
| Price of gas equal to per 1000 cubic feet . . . | 4/2, 3/10, 3/7 | 4/2·4, 3/11 6, 3/8 8 | 3 9·6 | 3/3·48 to 4/4·64 | 3/11·04 to 5/0·72 | 4/4, 4/2 | 4/2 6, 3/10·92 4/1 |
| **Costs per 1000 Cubic Feet of Gas Sold.** | | | | | | | |
| REVENUE ACCOUNTS. | d. | d. | d. | d. | d. | d. | d. |
| Coals, oil, &c. . . . . | 24·59 | 27·99 | 27·00 | 27·72 | 30·39 | 26·21 | 29·51 |
| *Less* residuals—Coke and breeze. . . . . | 12·11 | 13·53 | 13·27 | 12·74 | 11·46 | 10 08 | 9·67 |
| Tar . . . . . | 3·65 | 5·42 | 4·92 | 3·94 | 4·26 | 4·23 | 3·88 |
| Amm. liq. and sulph. amm. | 1·51 | 1·81 | 2·32 | 1·30 | 1·00 | 1·00 | ·67 |
| Total residuals . . . | 17 27 | 20·76 | 20·51 | 17·98 | 16·72 | 15·31 | 14 22 |
| Net for coals, oil, &c. . | 7·32 | 7·23 | 6·49 | 9·74 | 13·67 | 10·90 | 15 29 |
| MANUFACTURE— | | | | | | | |
| Salaries . . . . . | ·55 | 1·22 | ·90 | ·98 | 1·18 | ·58 | 1·01 |
| Wages—carbonizing . . . . . | 2·42 | 3·20 | 2·74 | 2·89 | 3·46 | 3·42 | 2·96 |
| Purification . . . . . | ·32 | ·72 | ·42 | ·75 | ·46 | ·66 | ·64 |
| Repairs—plant . . . . . | 11·36 | 9·06 | 9·41 | 12·25 | 12·42 | 13·29 | 8·75 |
| Net manufacture . . | 21·97 | 21·43 | 19·96 | 26·61 | 31·19 | 28·85 | 28·65 |
| DISTRIBUTION— | | | | | | | |
| Wages and salaries . . . . . | 2·42 | 1·64 | 1·88 | 1·99 | 2·30 | 1·57 | 2·38 |
| Repairs—Mains and services, &c. . . . . | 3·34 | 3·50 | 2·79 | 4·38 | 3·97 | 6·35 | 3·33 |
| „ Meters and prep. meters and fittings. | 2·23 | 4·51 | 3·35 | 2·88 | 3·38 | 3·19 | 1·93 |
| „ Stoves—ordinary and prepayment . | 2·77 | 3·37 | 3·05 | 3·84 | 2·77 | 2·06 | 2·30 |
| Total net manufacture and distribution . | 32·73 | 34·45 | 31·03 | 39·70 | 43·61 | 42·02 | 38·59 |
| Public lamps—lighting and repairing . . . . | ·81 | ·95 | ·57 | ·89 | 1·24 | ·87 | ·72 |
| Rents, rates, and taxes . . . . . | 3·78 | 2·26 | 2·50 | 1·39 | 2·07 | 2·26 | 2·24 |
| MANAGEMENT— | | | | | | | |
| Directors, Auditors, and salaries (Secretary, &c.) | ·42 | ·64 | ·67 | ·63 | ·79 | ·73 | ·56 |
| Collectors . . . . . | ·96 | 1·32 | 1·57 | 1·09 | ·96 | 1·05 | ·86 |
| Stationery and general charges . . . . . | ·73 | 1·15 | ·85 | ·83 | ·69 | ·71 | ·64 |
| Profit-sharing . . . . . | ·46 | 1·06 | 1·31 | 1·31 | ·88 | ·70 | .. |
| Bad debts. . . . . | ·08 | ·06 | ·03 | ·08 | ·03 | ·02 | ·04 |
| Law and parliamentary charges . . . . . | ·01 | ·03 | ·02 | ·05 | ·05 | ·02 | ·15 |
| Superannuations, Pension Funds, &c. . . . . | ·88 | 1·17 | 1·40 | ·87 | 1·32 | ·70 | ·64 |
| National Insurance . . . . . | ·31 | ·42 | ·30 | ·38 | ·06 | ·33 | ·33 |
| Sundries . . . . . | ·06 | ·07 | ·04 | ·02 | .. | .. | ·04 |
| Total expenditure (*less* residuals) . . . | 41·23 | 43·58*b* | 40·29 | 47·24 *e* | 51·70 | 49·41 | 44·81 |
| GAS. . . . . | 45·12 | 46·57 | 44 53 | 44·68 | 52·59 | 50·16 | 48·96 |
| Rentals—Meters and prep. meters and fittings. | 4·05 | 4·33 | 3·72 | 5·31 | 3·02 | 1·89 | 4·40 |
| Stoves . . . . . | 1·82 | 1·71 | 2·33 | 4·85 | 2·55 | 7·37 | 1·51 |
| Incand. mantle maintenance . . . | .. | .. | ·12 | ·51 | .. | ·01 | .. |
| Miscellaneous . . . . . | ·15 | ·08 | ·04 | ·08 | ·08 | ·14 | ·07 |
| Total—Gas, rentals, &c. . . . . | 51·14 | 52·69 | 50·74 | 55·43 | 58·24 | 59·57 | 54·94 |
| Balance, being profit . . . . . | 9·91 | 9·11 | 10·45 | 8·19 | 6·54 | 10·16 | 10·13 |
| Dividend and interest . . . . . | 9·66 | 7·91 | 9·31 | 8·04 | 7·60 | 8·06 | 8·09 |
| Surplus or deficit . . . . . | ·25 | 1·20 | 1·14 | ·15 | *Def.* 1·06 | 2·10 | 2·04 |
| Contributions to funds and sundry payments . | ·37*a* | ·91*c* | .. | ·12 *f* | ·83 *g* | 2·32 *h* | ·98 *d* |
| SUNDRIES. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| Coals cost per ton . . . . . | 28 11·37 | 28 5·95 | 31 2·72 | 31 4·70 | .. | 29 8·92 | .. |
| Coke realized per ton of coal . . . . . | 15 6·19 | 13 6 55 | 16 4·92 | 14 1·59 | 14 1·89 | 11 6·10 | 13 11·39 |
| Coke „ „ of coke . . . . . | 28 11·20 | 28 2·56 | 28 7·11 | 27 2·14 | 28 0·05 | 26 5·46 | 26 6·23 |
| Breeze „ per ton . . . . . | 10 9 62 | 3 9·75 | 4 6·22 | 7 3·12 | 5 8·57 | 9 9 72 | 10 0·48 |
| Tar realized per gallon . . . . . | 0 6·40 | 0 7·03 | 0 6·99 | 0 6·08 | 0 6·57 | 0 7·18 | 0 6·26 |
| Amm. liquor, &c., realized per butt (8 oz.) . | 6 1 59 | 4 9·95 | 7 11·86 | 4 8·34 | 4 0·42 | 4 1·30 | 2 11·28 |
| Percentage of stoves at rental to consumers . | 78 | .. | 83 | 100 | 113 | 81 | 96 |
| Bad debts per cent. on total receipts . . . | ·11 | ·08 | ·05 | ·12 | ·05 | ·02 | ·06 |
| Net profit per cent. on ordinary capital . . . | 5·47 | 6 89 | 6·85 | 7·12 | 4·98 | 9·30 *i* | 8·53 |
| Water gas per cent. on total make of cubic feet . | 27·40 | .. | 17 05 | 10·64 | 27·14 | 22·38 | .. |

*a*—Redemption Fund . . . . . d. ·29
Reserve Fund . . . . . ·08
·37

*b*—Special Purposes Fund eliminated.

*c*—Special Purposes Fund . . . . . d. ·62
Reserve Fund . . . . . ·29
·91

*d*—Special Purposes Fund.
*e*—Capital Duty eliminated.
*f*—Capital Duty. d.
*g*—Special Purposes Fund . . . . . ·61
Reserve Fund . . . . . ·22
·83

*h*—Insurance Fund . . . . . d. ·89
Renewal Fund . . . . . ·89
Reserve Fund . . . . . ·46
Exs. *re* Issue of Stock . . . . . ·08
2·32

*i*—Including Electricity Results.

# COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

## STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER THERM SOLD FOR THE YEAR 1923.

**Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.**

| | Gas Light and Coke. | South Metropolitan. | Commercial. | Wandsworth. | South Suburban. | Tottenham. | Brentford. |
|---|---|---|---|---|---|---|---|
| Declared calorific value . . . . B.Th.U. | 500 | 560 | 475 | 470 | 460 & 480 | 500 | 460 & 500 |
| Gas sold on declared calorific value therms | 167,059,775 | 84,057,306 | 17,658,566 | 14,137,459 | 14,557,793 | 13,413,201 | 23,069,127 |
| Increase . . . . . per cent. | 5·08 | 3·34 | 3·54 | 5·70 | 5·14 | 8·76 | 8·57 |
| Gas made per ton coal on works tests therms | 70·22 | 72·03*b* | 70·21 | 69·48 | .. | 69·66 | .. |
| Gas unaccounted for . . . . . per cent. | 7·20 | 3·72 | 7·97 | 7·26 | 7·08 | 7·94 | 5·97 |
| Coke made for sale per ton of coal . cwt. | 10·73 | 9·60 | 11·48 | 10·40 | 10·11 | 8 70 | 10·52 |
| Tar made per ton of coal . . . . gallons | 9·28 | 9·43 | 10·07 | 8·54 | 9·86 | 9·48 | 10·10 |
| Liquor made per ton of coal . . gallons, 8 oz. | 35·91 | 41·12 | 39·55 | 37·10 | 34·08 | 35·32 | 36·99 |
| Percentage of coke used as fuel . . . . . | 16·63 | 21·83 | 14·97 | 16·80 | 20·94 | 26·79 | 15·90 |
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| Capital expended per therm sold . . . . . | 1 9·59 | 1 4·84 | 1 8·56 | 1 8·88 | 2 0·49 | 1 11·85 | 1 8·68 |
| Price of gas per therm . . . . . | 10d., 9⅝d., 8⅜d. | 9d., 8½d., 8d. | 9⅜d. | 8⅜d. to 11⅛d. | 9⅝d. to 13⅝d. | 10⅜d., 10d. | 11d. 10⅛d. 9⅝d. |
| **Costs per Therm Sold.** | | | | | | | |
| REVENUE ACCOUNTS. | d. | d. | d. | d. | d. | d. | d. |
| Coals, oil, &c. . . . . | 4·92 | 5·00 | 5·69 | 5·90 | 6·53 | 5·24 | 6·27 |
| *Less* residuals—Coke and breeze . . . . | 2·42 | 2·42 | 2·79 | 2·71 | 2·46 | 2·01 | 2·05 |
| Tar . . . . . | ·73 | ·97 | 1·04 | ·84 | ·91 | ·85 | ·83 |
| Amm. liq. and sulph. amm. | ·30 | ·32 | ·49 | ·28 | ·22 | ·20 | ·14 |
| Total residuals . . | 3·45 | 3·71 | 4·32 | 3·83 | 3·59 | 3·06 | 3·02 |
| Net for coals, oil, &c | 1·47 | 1·29 | 1·37 | 2·07 | 2·94 | 2·18 | 3·25 |
| MANUFACTURE— | | | | | | | |
| Salaries . . . . . | ·11 | ·22 | ·19 | ·21 | ·25 | ·12 | ·21 |
| Wages—carbonizing . . . . . | ·48 | ·57 | ·57 | ·61 | ·74 | ·68 | ·63 |
| Purification . . . . . | ·06 | ·13 | ·09 | ·16 | ·10 | ·13 | ·14 |
| Repairs—plant . . . . . | 2·27 | 1·62 | 1·98 | 2·61 | 2·67 | 2·66 | 1·86 |
| Net manufacture . . | 4·39 | 3·83 | 4·20 | 5 66 | 6·70 | 5·77 | 6·09 |
| DISTRIBUTION— | | | | | | | |
| Wages and salaries . . . . . | ·48 | ·29 | ·40 | ·43 | ·49 | ·31 | ·50 |
| Repairs—Mains and services, &c. . . . | ·67 | ·62 | ·59 | ·93 | ·85 | 1·27 | ·71 |
| ,, Meters and prep. meters and fittings | ·45 | ·81 | ·70 | ·61 | ·73 | ·64 | ·41 |
| ,, Stoves—ordinary and prepayment . | ·56 | ·60 | ·64 | ·82 | ·59 | ·41 | ·49 |
| Total net manufacture and distribution | 6·55 | 6 15 | 6·53 | 8·45 | 9·36 | 8·40 | 8·20 |
| Public lamps—lighting and repairing . . . . | ·16 | ·17 | ·12 | ·19 | ·27 | ·18 | ·15 |
| Rents, rates, and taxes . . . . . | ·76 | ·40 | ·53 | ·30 | ·44 | ·45 | ·48 |
| MANAGEMENT— | | | | | | | |
| Directors, Auditors, and salaries (Secretary, &c.) | ·08 | ·11 | ·14 | ·13 | ·17 | ·15 | ·12 |
| Collectors . . . . . | ·19 | ·24 | ·33 | ·23 | ·21 | ·21 | ·18 |
| Stationery and general charges . . . . | ·15 | ·20 | ·18 | ·18 | ·15 | ·14 | ·14 |
| Profit-sharing . . . . . | ·09 | ·19 | ·28 | ·28 | ·19 | ·14 | .. |
| Bad debts . . . . . | ·02 | ·01 | ·01 | ·02 | ·01 | ·00 | ·01 |
| Law and parliamentary charges . . . . | ·00 | ·01 | ·03 | ·01 | ·01 | ·00 | ·03 |
| Superannuations, Pension Funds, &c. . . . | ·18 | ·21 | ·29 | ·18 | ·28 | ·14 | ·13 |
| National Insurance . . . . . | ·06 | ·08 | ·06 | ·08 | ·01 | ·07 | ·07 |
| Sundries . . . . . | ·01 | ·01 | ·01 | ·00 | .. | .. | ·01 |
| Total expenditure (*less* residuals) . . | 8·25 | 7·78*c* | 8·48 | 10·05*f* | 11·10 | 9·88 | 9·52 |
| GAS . . . . . | 9·03 | 8·32 | 9·37 | 9·50 | 11·29 | 10·03 | 10·40 |
| Rentals—Meters and prep. meters and fittings | ·81 | ·77 | ·78 | 1·13 | ·65 | ·38 | ·94 |
| Stoves . . . . . | ·36 | ·31 | ·49 | 1·03 | ·55 | 1·47 | ·32 |
| Incand. mantle maintenance . . . | .. | .. | 03 | ·11 | .. | ·00 | .. |
| Miscellaneous . . . . . | ·03 | ·01 | ·01 | ·02 | ·01 | ·03 | ·01 |
| Total—Gas, rentals, &c. . . . . | 10·23 | 9·41 | 10·68 | 11·79 | 12·50 | 11·91 | 11·67 |
| Balance, being profit . . . . . | 1·98 | 1·63 | 2·20 | 1·74 | 1·40 | 2·03 | 2·15 |
| Dividend and interest . . . . . | 1·93 | 1·41 | 1·96 | 1·71 | 1·63 | 1·61 | 1·72 |
| Surplus or Deficit. . . . . | ·05 | ·22 | ·24 | ·03 | *Def.* ·23 | ·42 | ·43 |
| Contributions to funds and sundry payments . | ·07*a* | ·16*d* | .. | ·03*g* | ·18*h* | ·46*i* | ·21*e* |
| SUNDRIES. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| Coals cost per ton . . . . . | 28 11·37 | 28 5·95 | 31 2·72 | 31 4·70 | .. | 29 8·92 | .. |
| Coke realized per ton of coal . . . . | 15 6·19 | 13 6·55 | 16 4·92 | 14 1·59 | 14 1·89 | 11 6·10 | 13 11·39 |
| Coke ,, ,, of coke . . . . . | 28 11·20 | 28 2·56 | 28 7·11 | 27 2·14 | 28 0·05 | 26 5·46 | 26 6·23 |
| Breeze ,, per ton . . . . . | 10 9·62 | 3 9·75 | 4 6·22 | 7 3·12 | 5 8·57 | 9 9·72 | 10 0·48 |
| Tar realized per gallon . . . . . | 0 6·40 | 0 7·03 | 0 6·99 | 0 6·08 | 0 6·57 | 0 7·18 | 0 6·26 |
| Amm. liquor, &c., realized per butt, 8 oz. . . | 6 1·59 | 4 9·95 | 7 11·86 | 4 8·34 | 4 0·42 | 4 1·30 | 2 11·28 |
| Percentage of stoves at rental to consumers . . | 78 | .. | 83 | 100 | 113 | 81 | 96 |
| Bad debts per cent. on total receipts . . . . | ·11 | ·08 | ·05 | ·12 | ·05 | ·02 | ·06 |
| Net profit per cent. on ordinary capital . . . | 5·47 | 6·89 | 6·85 | 7·12 | 4·98 | 9·30*j* | 8·53 |
| One fifth penny variation equals . . . . . | £139,216 | £70,048 | £14,715 | £11,781 | £12,131 | £11,178 | £19,224 |
| Water gas per cent. on total make of cubic feet. | 27·40 | .. | 17·05 | 10·64 | 27·14 | 22·38 | .. |

*a*—Redemption Fund . . . . . d. ·06
Reserve Fund . . . . . ·01
·07

*b*—On Declared Value.

*c*—Special Purposes Fund eliminated.

*d*—Special Purposes Fund . . . . . d. ·11
Reserve Fund . . . . . ·05
·16

*e*—Special Purposes Fund.
*f*—Capital Duty eliminated.
*g*—Capital Duty. d.
*h*—Special Purposes Fund . . . . . ·13
Reserve Fund . . . . . ·05
·18

*i*—Insurance Fund . . . . . d. ·18
Renewal Fund . . . . . ·18
Reserve Fund . . . . . ·09
Exs. *re* Issue of Stock . . . . . ·01
·46

*j*—Including Electricity Results.

# TESTING GAS-METERS—FROM THE CONSUMER'S SIDE OF THE COUNTER.

By Norton H. Humphrys.

The National Gas Council have been impressed with the deficiencies of the arrangements in connection with testing gas-meters, as provided by the existing Sales of Gas Acts, and are tabulating the views of members on the subject. There is no question as to the reliability and accuracy of the testing apparatus. After digesting the information obtained, they might with much advantage proceed to ascertain what the consumers have to say. Meanwhile, a few considerations from the consumer's side of the counter may not be out of place.

The standing arrangements, so far as they apply to small undertakings, are so roundabout, costly, and cumbersome, that they might appropriately be placed by the side of the circumlocution office rendered immortal by Charles Dickens. Many undertakings having 1000 or more accounts on their books do not obtain half-a-dozen certificates under the Sales of Gas Acts in the course of twelve months. The reasons why so few local authorities availed themselves of the powers granted by the Acts, within the limited period allowed, or why so few county councils have subsequently done so, are not far to seek. A gas-meter testing station cannot be provided for £50, or maintained in going order at an annual expenditure not exceeding that figure. A specially qualified and reliable inspector must be appointed, and an assistant. At current prices of materials and labour, the first outlay will run well into four figures, and the annual cost of upkeep and operation will not be much less. If the necessary outlay placed the gas-meter testing station beyond the reach of all except the larger order of authorities in 1860, what can we say about 1924? Unless thousands of meters are presented for examination in the course of a year, the station will be a charge on the rates. In these times, the enormous outlay on doles, unemployment, housing, education, &c., has led to agitation on the score of economy. Both borough and county authorities are fairly snowed under by large responsibilities, in many cases more than the district can properly afford. The only chance of successfully introducing a scheme for testing gas-meters in the district is a sure prospect that it could be made a means—to use an expression as popular with certain classes as its distance from accuracy—of "relieving the rates." Many know from experience that this does not mean the relief of the ratepayer by a reduced poundage, but further extravagance that would not pass muster in the form of a direct charge.

The introduction of the gas-meter was not hailed with delight by the consumers. Far from being popular on the consumer's side of the counter, it was received with a degree of suspicion and obloquy that has never been accorded to similar measuring devices. Probably the substitution of a definite price per 1000 c.ft. for a fixed rate per burner representing an indefinite quantity of gas was attended by increases in the quarterly bills; and the man who has had too much for his money is always more difficult to placate than the one who has had too little, because there is not the soothing effect of an unexpected rebate or return. The public have now more pressing and important matters on which they can let-off steam. But there was a time when the gas-meter ranked with the "mother-in-law" or the "old maid" so dear to the humorous writers of the sixties and seventies. All sorts of erroneous notions found ready credence, whether founded on a slight substratum of fact, or pure invention. A square inch of fact can be spread over a square mile by clever but unscrupulous advocates. Visitors to the gas-works jumped to the conclusion that the exhauster was a sort of infernal machine for forcing unconsumed gas or air through the meters. The usual practice of keeping the entrance gate under lock and key tended to increase suspicion that all was not above-board at the gas-works. Astute observers called the attention of neighbours to the fact that the gas-meter would work not only when no gas was being consumed, but even when the main tap was presumably closed tight. The need for uniform quality of gas, one day with another, was not fully appreciated until the examiner took to dropping in at unexpected times. The explanation was the use of cheap main taps that would not "shut-off" in the fullest sense of the term, together with inferior fixtures that would cut a sorry figure under the searchlight of a modern leakage test. Lights in outlying parts of the premises might at times blow-off for several minutes after opening the tap, before the gas would ignite, and a longer period would elapse before normal illuminating power was evident. "He lies like a gas-meter," was a common remark; and stories like that of a light sleeper who was awakened by slight clicking noises during the small hours of the night, and assured that it was only the gas-meter pegging away, were accepted as something more than pure fiction. Apart from actual manufacturers, very few had accurate understanding about the structure and working of a gas-meter. Many set it down as a conjuring box, or a discreditable medium for the construction of fraudulent claims; others thought that guess-work or estimate had something to do with the figures entered by the inspector, and that an assurance, when he applied to see the meter, that "we have not used so much this quarter" had a useful influence on the amount of the charge. For one who fairly recognized the meter as a wonderfully accurate and reliable machine, there were a dozen who regarded it with contempt.

Other unfortunate associations with the charges based upon meter indications were the extensive use of the term "gas *rate*," now obsolete, and the quarterly account, which is still an established institution for the ordinary type of meter. The first suggested arbitrary estimation as an element in fixing the charge; and the influence of the second may be illustrated by assuming that the household necessaries supplied by the butcher or grocer were dealt with on similar lines, a bare total of quantities, without further detail, being sent in. A statement that simply gave the number of pounds of beef or mutton supplied during the quarter would frequently lead to doubt as to the actual receipt and legitimate consumption of the quantity charged for. The consumer would be as likely to argue that he had never had it, as he is to assert that he could not possibly have used the gas. How seldom any dispute arises about payments in the slot department! A common experience in the gas-rental office is that a customer noted in bygone years for energetically kicking against a charge of about £2 per quarter, now contentedly puts about 5s. a week into the slot meter. He is pleased that there is no quarterly bill, or that the "missus" provides the shillings out of the housekeeping expenses, and that he is not bothered about it. The practice in many foreign countries is to render gas accounts monthly; and our limited home experience with short collection periods goes to show that it might be adopted in many parts of the country, to the advantage of all concerned.

Many of these details belong to a bygone era, and no object would be served by their resuscitation, if remains of them were not with us to-day. The views of consumers, as expressed in the course of a recent Government inquiry, are interesting. The leading feature was an entire ignorance of, or lack of, any faith in the means provided by our legislature for guarding the rights of the consumer of gas. Many placed their own estimate as more reliable than the indications of the meter. The inquiry stopped abruptly at a bare statement of grievances, and acceptance of the existing system, instead of following on by natural sequence to the objections to present practice, and the possibility of partially or entirely meeting them. On such points one would like to have the views of typical modern consumers—say, a small householder, the occupiers of shops of various sizes, large users for industrial or residential purposes, and especially of the qualified officials in charge of the gas departments of railway companies, large public institutions, theatres, &c.—as to defects, real or imaginary, in present arrangements. With these as an addition to the views of gas engineers and managers, one might proceed to examine the possibilities of putting things on a more satisfactory basis.

Though the Sales of Gas Acts were intended for the benefit more of consumers than of the companies, their chief use as at present administered is for the information of the latter, who are glad of any guidance as to the proportion of the unaccounted-for gas that may be credited to slow registration of meters, or to a basis for a system of replacements. They have not done much in the way of an amicable settlement of disputes or placation of the consumer. He may accept the ruling of an official certificate, but simply under protest, not because he is satisfied. Perhaps one may say that a certain amount of dissatisfaction is unavoidable, but that is the greater reason for removing unnecessary causes of annoyance. The usual procedure may be quite clear to any person who has taken the trouble to read the Sales of Gas Acts; but the average consumer does not even know of their existence, and from his point of view there is something underhanded and suspicious about the whole thing, regarded as entirely under the control of the gas company. He very naturally wants to know why the test cannot be conducted on similar lines to the course adopted with pint pots or pound weights, if not *in situ*, at least in the district; or he raises the not unreasonable objection that much might happen in the way of disturbing the machinery of the meter during the interval commencing with the removal, and terminating perhaps after some weeks with the official test. We are dealing with the assumption that the meter is alleged to be "fast." In course of experiences with some thousands of disputed accounts, I can only recall two instances of the meter being said to be "slow." Many take the line that as the company are paid for and responsible for proper maintenance, they have no claim outside the quantity of gas actually registered, and that anything in the way of a surcharge is an imposition. A refusal to pay the account having been duly entered at the gas office, a fitter takes away the meter concerned, and the consumer knows no more until, after a time, an official calls with a Government certificate, consisting of a page of foolscap inclusive of much irrelevant matter, and points to a result that may or may not—probably the latter—agree with preconceived notions. The fact of the certificate being a legal document does not carry much weight with one who has had some experience in adjusting overcharges with the income-tax and other Government departments. The whole proceeding tends to irritate at a time when a contrary effect is particularly desirable. Annoyed by the delay, the consumer may refuse the official ruling, and fall back on various specious arguments to show that he could never have used the quantity of gas, and is reasonably entitled to a substantial reduction, perhaps one fourth, perhaps more; and if for the sake of peace or other considerations a compromise is agreed to, a door is opened for future trouble. Above all other things, the evidence afforded by the meter index must not be overruled.

One may be reminded that the views of the consumer are only "opinions;" but these cannot be neglected with impunity. To paraphrase a well-known saying: "Give me the opinions, and the

facts may be left to take care of themselves." The affairs of the world are governed by opinions, mostly based on incomplete or inaccurate premises, as we know to our cost. Artificial manufacture of opinion has proved the success or failure of many enterprises, commercial and otherwise. Gas officials are rather inclined to plain fact, and to deal with business according to their own lights, forgetful that the consumer has a mind of his own which may be obstinate or ill-informed, but is none the less a working mind.

The official testing apparatus is too cumbersome and elaborate to command the confidence of the consumer. He wants something that can be applied *in situ*, or at least at a local office, to which he could accompany the gas company's man, witness the test, and receive a certificate within an hour. There should be no long interval during which the meter is out of sight, but not out of mind. Having regard to the refinements effected in connection with the calorimeter and other laboratory appliances, there is nothing Utopian about anticipation of a device that would meet such requirements, need no special housing, and could be put on the market at a figure which would bring it within the reach of small undertakings. The gas examiner, while taking the calorific value of the gas, might also certify the meter test. At present he uses the $\frac{1}{2}$-c.ft. bottle for proving the calorimeter attachment. This appliance, and the unit c.ft. bottle, suggest lines for further development.

One wonders why the test meter as employed for adjustment of the works meters finds so little favour with gas companies for use in the district.

## DRAFT RATING AND VALUATION BILL.

### Report of the Special Committee of the Association of British Chambers of Commerce—The General Principles.

We have received from Mr. Edwin Upton, the Treasurer of the Liverpool Gas Company, a copy of the Liverpool Chamber of Commerce "Monthly Journal," which contains the considered opinion of the Special Committee of the Association of British Chambers of Commerce on the general principles contained in the Draft Rating and Valuation Bill. This he regards as so excellent a précis of the true position, that he has kindly obtained permission for its reproduction in the pages of the "JOURNAL;" and it will be found below. Mr. Upton says that, while he thinks all are agreed that a revision of valuation practice is desirable and necessary, there is widespread feeling that under the proposals of the Draft Bill the last state would be worse than the first; and there is the dangerous bureaucratic tendency to transfer power from the local authorities. The question is a vital one to gas undertakings, whose present position is threatened.

PRELIMINARY.

1.—This Association desires in the first instance to express appreciation of the course which has been adopted by the Ministry of Health in submitting a Draft Bill with an Explanatory Memorandum for the consideration and comments of all interests concerned. In important legislation of this kind, affecting as it does, directly or indirectly, every interest in the country, and when no special emergency exists, it must result in advantage as well as economy of time to H.M. Government as well as to the community, if the Department concerned is in possession of the considered views and criticisms of all parties affected before submitting a Bill to Parliament. The Association trusts that the experience of the Ministry in this case will be such as to justify all Government Departments in adopting a similar course in the future.

VIEWS OF CHAMBERS.

2.—The Draft Bill and Memorandum have had the careful consideration of the principal chambers of commerce of the country, whose views have been the subject of close study by the Executive Council of this Association, representing all the British chambers of commerce; and the Association accordingly submits the following observations upon the principles involved on behalf of the trade and industry of the country, *which has to bear the major portion of the burden of rates and taxes.*

MAIN OBJECTS OF THE BILL.

3.—With the main objects underlying the proposals of effecting reforms in the existing system of rating and valuation, as stated in Clause 2 of the Memorandum, the Association is largely in accord, as it is considered that the reform is desirable, particularly as regards—

1.—Simplification of the present rating system.
2.—Consolidation of rates, where not already existing.
3.—A more equitable method as to precepts.
4.—A quinquennial valuation.
5.—A single valuation for rates and taxes.
6.—Greater uniformity in valuation.
7.—Making the assessment committees more representative of different interests.

SUGGESTED ECONOMIES.

4.—In Clause 3 of the Memorandum it is stated that economies will be effected by avoiding duplication of work and the unnecessary expense occasioned by the separate valuation for purposes of rates and taxes, the maintenance of separate rating authorities, &c. With this view the Association entirely concurs; but it is doubtful whether the Bill as drafted will produce this desired effect, especially if a new valuation authority is created.

CHANGES IN RATING AND VALUATION AUTHORITY.

5.—With regard to rating, the Association approves in principle of the transfer of these functions to the various rating authorities as proposed in the Bill, and considers this essential to effect the necessary reforms referred to. The Association considers, however, that the position of those local authorities which have already adopted similar steps should have different treatment from that suggested. With regard to valuation, the Association considers that, though many of the proposals are desirable, it is questionable how far complete uniformity would produce equitable results.

PROPOSED CENTRAL VALUATION AUTHORITY.

6.—This Association, as well as individual chambers, in common with many public bodies, strongly disapproves of the proposed creation of a central valuation authority, on the ground that it is (1) unnecessary, there being no justification for the abrogation of the powers of local authorities generally, who are better able to judge of local conditions, and (2) uneconomical, involving the creation of a new department and great expense and inconvenience to all concerned. The Association, nevertheless, appreciates the fact that railways, canals, and such parts of public utility works as pass through more than one rating area, call for special treatment in order to ensure uniformity of method of valuation.

For this purpose—

(1) Certain general principles and regulations should be laid down for the guidance of the local valuation authorities.
(2) In lieu of the general system of appeal provided for in the Draft Bill, a special appeal body should be set up to deal with appeals against the valuation of such special properties.

The Association considers no other departure from the general scheme of the Bill is necessary in order to produce the desired result, and that in the course of a short time it will be found that by means of these regulations and the decisions of the appeal body, a uniform system of procedure will prevail throughout the country.

Whether or not decisions may be arrived at on this matter, the Association voices the unanimous feeling of the chambers of commerce and of other important bodies that section (i.) of sub-section (1) of Clause 28 should, in any case, be deleted.

RATING OF MACHINERY.

7.—With regard to the rating of machinery, the Association has on a number of occasions, by deputation and otherwise, submitted its views to the Government as to the necessity for a change in the system of valuation. The Association is therefore glad to note the appointment of a Special Committee to inquire into this subject, and the views of the chambers will be presented to the Committee in due course. The Association, however, is strongly of the opinion that the question of the rating of machinery is vital to any reform of rating and valuation, and that unless the Bill contains provisions to meet this difficulty, it will not fulfil what is desired. The Association considers it would be a grave mistake to attempt to carry out an incomplete reform when the whole matter could be completely dealt with in a few months.

EXPENSES OF ASSESSMENT COMMITTEES AND VALUATION AUTHORITIES.

8.—The Association considers that there should be an equitable division of these expenses between the local authorities and the Inland Revenue.

JOINT VALUATION FOR RATES AND TAXES.

9.—As the whole Bill is based upon the assumption that there will be a common valuation, and as this is one of the most important and urgent reforms in connection with valuation, and one which is demanded by the country generally, the Association considers it is necessary that the Bill should provide for this and fix an appointed day when it comes into operation; and this appointed day should not be more than two years after the Bill comes into operation. The Association recognizes that, if this is done, it is proper to grant the Inland Revenue Officer a status and reasonable powers from the time the Bill comes into operation.

DIRECT RATING OF OWNERS.

10.—The Association considers that it is undesirable to extend the principle of direct rating of owners instead of occupiers, and that the provision of the Statement of Rates Act, 1919, should be put into actual operation.

INLAND REVENUE OFFICERS.

11.—The Association considers that the Draft Bill gives too extensive powers to the Inland Revenue Officers.

POWERS OF MINISTER.

12.—The Association, while, as already stated, agreeing with the general principles laid down in the Bill, with certain exceptions, considers that the powers left to the Minister in the Draft Bill are too vague and extensive, and, as they stand, would deprive local authorities of much of the power at present properly vested in them. The Minister, in virtue of the powers proposed to be conferred upon him, would be able to modify and even alter the intention of Parliament as expressed in the Bill. Such powers are opposed to the policy of decentralization and local control, which is recognized as becoming increasingly necessary. It is, moreover, desirable that the legislature should define and limit the spheres and duties of all authorities, whether central or local, administering the Act.

J. SANDEMAN ALLEN, Chairman of the Committee.

Unanimously approved by the Executive Council of the Association.

ARTHUR BALFOUR, President.
R. B. DUNWOODY, Secretary.

*Feb.* 6, 1924.

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**Southern Association of Gas Engineers and Managers (Eastern District).**—The next meeting of the Eastern District of the Association will take place on Wednesday next, March 26, at 2.30, at the Institution of Gas Engineers, No. 28, Grosvenor Gardens, S.W.

## THE LIGHTING-UP OF STEAM WAGON FIRES BY GAS.

The issue of "Motor Transport" for March 3 contains a description of a new product of Messrs. Keith and Blackman Co., Ltd., of No. 27, Farringdon Avenue, E.C. 4. It relates to an installation of high-pressure gas-burners adopted by Messrs. Viney & Co., Ltd., of Preston, for lighting-up their fleet of Leyland steam lorries. The plant includes a rotary compressor capable of delivering town gas at a pressure of about 3 lbs. per sq. in. Attached by a rubber pipe is a grid fitted with burner nozzles and fed through injectors, which mix gas and air. These grids are similar to domestic grillers on a large scale, and are built to withstand rough usage. The burners are so disposed as to play between the firebars when the grid is pushed into the ash pan.

Inserting the Burner in the Ash Pan.

To carry out the lighting-up process, the fire is made up of coke or coal, and the lighted burner is placed in position in the ash pan, where it is left for ten or twelve minutes. After this period it is withdrawn, when, in ordinary circumstances, the fire will be well alight. One burner per four wagons is considered desirable, and the equipment for a fleet of sixteen vehicles costs approximately £40. The compressor takes about 1 H.P., while each burner consumes 40 c.ft. of gas to light one fire. With gas at 3s. 8d. per 1000 c.ft. this equals 1·6d., while labour can be put down at 1·4d. per fire. This represents an average cost of 3d. for lighting-up each wagon. By the old method of using sawn-up sleepers, ignited by paraffin-soaked wash, Messrs. Viney found that the cost varied from 10d. to 1s. per wagon. In addition to lower costs, there is a saving in space, freedom from dirt and inflammable litter, and the abatement of the smoke nuisance in the sheds. The apparatus should prove of great utility to users of steam vehicles.

## THE SOCIETY OF CHEMICAL INDUSTRY.

### Nitrogen of Coal, and Ammonia Recovery.

At a meeting of the Birmingham and Midland Section of the Society of Chemical Industry, held at the University of Birmingham on Feb. 21, Dr. A. C. Monkhouse (Fuel Research Department of the University of Leeds and the Institution of Gas Engineers) read a paper on "The Nitrogen of Coal, and Ammonia Recovery."

There was a growing demand, he pointed out, for nitrogenous manures, particularly for agriculture; and it was important that recognition should be given to the relative position of the bye-product ammonia to the whole nitrogen industry. The shortage of the natural deposits had given an impetus to the manufacture of nitrogen products. The total world production and consumption of ammonia compounds in 1913 was about 1,322,000 tons, whereas the present output was 2,040,000 tons per annum, of which it was estimated 1,770,000 tons were in the form of ammonium sulphate. The time was fast approaching when the output would rival that of nitrate of soda. One of the sources of ammonium sulphate—in this country practically the main source—was the bye product ammonia industry, depending on the gas and coke industries.

An account of the present knowledge of the origin and nature of the nitrogen in coal was given. Adventitious sources such as animal albuminoid matter and absorbed nitrogen were mentioned; but the main source lay in the original protein bodies of the plant substance. On distilling coal, 11 to 18 p.ct. of the nitrogen was obtained as ammonia, 50 to 80 p.ct. was left in the coke, and the remainder was found as free nitrogen, cyanogen, and as nitrogen compounds in the tar. The amount of nitrogen remaining in the coke was emphasized, and the influence of carbonizing coal in different atmospheres was described in detail, with special reference to the author's work in conjunction with Prof. J. W. Cobb, presented to the Institution of Gas Engineers in 1922. An inert atmosphere of nitrogen, an atmosphere of hydrogen, and an atmosphere of steam were compared. The nitrogen compounds in coal were converted on carbonization into compounds which might, roughly, be classed under three heads:

1. Those which yield ammonia direct on heating.
2. Those which yield ammonia on combination with hydrogen.
3. The so-called "carbon nitrides," which are split up by steam with the formation of ammonia.

Hydrogen, said the author, was beneficial in increasing the yield of ammonia. The idea of obtaining ammonia by passing hydrogen over metallurgical coke was, however, impossible, due to the nitrogen being present in a form only decomposable by steam. During carbonization the maximum hydrogen evolution occurred at the time of maximum ammonia evolution, thus increasing the yield of ammonia by its "preserving" action.

### Specific Gravity of Ammonia.

Messrs. W. N. Price and C. S. L. Hawkins (Messrs. Chance and Hunt, Ltd., of Oldbury) contributed a paper on "A New Determination of the Specific Gravity of Solutions of Ammonia." They pointed out that the table published by Lunge in 1889, showing the relationship existing between specific gravity and ammonia content of pure liquor ammonia had, up to the present, been accepted as the standard one, superseding those of Carius, Gruneberg, and Wachsmuth, but after a great number of determinations had been made of the ammonia content of pure liquor ammonia of an approximate specific gravity of 0·880, it was realized that the data given by Lunge were not strictly accurate. Invariably the analyses showed a lower percentage of ammonia than would be expected from published tables. The variations from Lunge's figures were so consistent that it was felt that a more reliable method for testing these high strength solutions was necessary. After many preliminary experiments a satisfactory method was devised, and was found to be so successful that it was eventually decided to check the whole of Lunge's figures.

The apparatus finally evolved, and used throughout the whole series of tests, consisted of a constant temperature bath, in which was placed the ammonia container—a glass vessel holding about 2 litres of liquor ammonia. To this was attached the weighing pipette, and to the other end of the pipette a temperature check device, finally delivering into a flask. Attached also to the container was a safety trap for the ammonia. The constant temperature bath was made of sheet iron having a jacket packed with asbestos wool. The water in the bath (about 30 litres) was agitated by paddles on a spindle running from end to end of the bath, and also by small jets of compressed air. The temperature of the water was regulated by an electrically-heated and controlled mercury-filled regulator, and was found to vary not more than 0·1° Fahr. in a few hours. All determinations were carried out at 60° Fahr. The ammonia container was a wide-mouth glass bottle holding about 2 litres, supported on a stand in the constant temperature bath. Through the indiarubber bung fitted to the bottle passed (1) a glass tube reaching to within ½ in. of the bottom; (2) a standardized Fahrenheit thermometer graduated in 0·1° Fahr., and capable of being read to 0·05° Fahr., the bulb of which was level with the bottom of the glass dip-tube; (3) a short outlet to the atmosphere, closed by indiarubber tubing and a pinchcock when necessary; and (4) a glass band connecting up to the safety trap. The ammonia used was a chemically pure solution of ammonia gas in distilled water; freshly made solutions being used to minimize any action on the glass of the containing vessel. The total amount of residue on evaporation did not exceed 5 parts per million. After the weighing pipette was filled and the taps closed, a finely-drawn piece of glass tube, into which had been sucked about 3 c.c. of methylated spirit, was inserted into the end pieces used for connecting up, and the small amount of ammonia solution remaining there was washed out by blowing the methylated spirit into these ends. A fine jet of dried compressed air was next blown into the ends for some seconds, until they were quite dry. It was found advantageous, in the case of solutions stronger than 0·880 specific gravity, to have the temperature-check vessel about 2 in. above the level of the liquor in the large ammonia vessel.

For the standardization of the acid used in the strength determination, pure sodium carbonate was used, and this method was also checked against pure dry ammonium chloride. Five grammes of the ammonium chloride were weighed out and distilled with caustic soda, through an apparatus containing a bulb tray, into an excess of the standard acid. The distillate was cooled, and the excess of acid titrated against normal soda, first with methyl orange as indicator, the final end point being determined with methyl red. After the sulphuric acid had been standardized, the caustic soda was standardized against the acid.

A comparison of the tables brought out the following points: For specific gravities between 0·880 and 0·885 the new figures obtained are lower than Lunge's; the maximum difference being 0 33 p.ct. For specific gravities between 0·885 and 0 996 the new figures are higher than Lunge's, though the difference is very small.

# MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

## ANNUAL GENERAL MEETING.

THE Annual General Meeting of the Association was held in the Grand Hotel, Birmingham, on Thursday last. At the opening of the proceedings Mr. P. N. LANGFORD, of Coventry (the outgoing President), was in the chair; and he was later succeeded by the new President, Mr. C. H. CARDER, of Oldbury, who delivered his address. This was followed by Mr. C. M. D. BELTON, of Shrewsbury, with a paper entitled "Some Problems and their Solution."

### THE MINUTES.

The HON. SECRETARY (Mr. T. Thornton, of Rowley Regis) read the minutes of the last meeting, and they were confirmed. He also notified the receipt of letters of apology from members who were unable to be present, and from the Presidents and Hon. Secretaries of kindred Associations.

### NEW MEMBER.

Mr. Charles S. Roberts, of Church Stretton, was elected a member of the Association.

### ANNUAL REPORT AND ACCOUNTS.

The PRESIDENT said the report and accounts for 1923 had been circulated among the members, and he did not think they called for comment. He moved that they be adopted.

The report stated that the number of ordinary members now on the books was 113, and the accounts showed a balance in hand of £94 17s. 1d.

Mr. F. J. WARD (Knowle) seconded the motion, and it was agreed to.

### COMMERCIAL ASSOCIATION.

Mr. B. W. SMITH (Walsall), as Chairman, next presented the tenth report of the Midland Commercial Gas Association, for the year ended Dec. 31 last. This showed the membership to be 57; and the fact was emphasized that the more members they could obtain, the better it would be for all concerned. Mr. Smith remarked that the past year had been one of great interest, and he referred to the National Gas Exhibition in Bingley Hall, and the British Commercial Gas Association conference in Birmingham, at which there was a good attendance, and much useful intercourse resulted. The Commercial Association had had good discussions on the price paid for gas-coal contracts and railway rates. Gas oil had also found its way into their discussions. Residuals had formed the chief source of interest—particularly the sale and scarcity of coke, which at the present time, as members were aware, was a very difficult question. The problem was to provide sufficient to meet the existing great demand. The depleted stocks were no doubt the result of the large quantities exported. Tar and sulphate of ammonia were a falling market, and would adversely affect some balance-sheets. Through the exceptionally prolonged frosty and inclement weather, coupled with the effects of the National Gas Exhibition, great impetus had resulted to gas sales. Their balance-sheet was a satisfactory one. It showed a slight falling-off, due to the contribution made to the National Gas Exhibition Fund. If further information was desired by any member, he would be pleased to furnish it.

The PRESIDENT said he was sure they were much indebted to Mr. Smith for his report. The problems they had been, and were still, up against—namely, the coal and coke questions—were very acute. He did not know whether other members were in the same position as he himself at Coventry. He had no coke, and could not get coal; and should a strike eventuate, he was afraid his condition would not be a very happy one.

The report was adopted, on the proposition of Mr. J R. DUFF (Banbury), seconded by Mr. W. G. S. CRANMER (Willenhall).

### PUBLICATION OF "JOINT TRANSACTIONS."

Mr. H. POOLEY (Leicester) said there were two resolutions standing in his name, but the subject-matter was so familiar to all the members that he did not think he need make any comment whatever on them. The value in the past of the volume of "Joint Transactions of the District Associations" had been so great that he was sure members would vote unanimously in favour of the two following resolutions, which he begged to move:

1.—That in order to provide each member annually with a copy of the "Joint Transactions of District Associations," whose previous years' subscription has been paid, the annual subscription shall be advanced to 15s. for members having control of works making under 50 million c.ft. of gas per year, and to £1 1s. for all other members.

2.—That Rule No. 13 be amended to read as follows—

"The annual subscription to be paid by each member having control of a works making under 50 million c.ft. of gas per year shall be 15s., and for all other members £1 1s., payable in advance on Jan. 1 each year, 2s. 6d. of the subscription to be credited to the Emergency Fund."

Mr. J. T. LEWIS (Wellingborough) seconded the resolutions.

Mr. DUFF: What does the Emergency Fund amount to at the present time?

The PRESIDENT: £89 9s. 2d.

Mr. F. SHEWRING (Stratford-on-Avon) said he agreed with the resolutions, but there was one point to which he would like to draw attention. He knew that it had been the custom for some companies to provide the money for technical literature, and in these cases he supposed receipts for two separate amounts could be given—one for the member's subscription proper, and the other for a fixed sum for the book which could be charged to the gas undertaking.

The PRESIDENT replied that it could be arranged for the Secretary to give two receipts.

Mr. WARD asked whether the first resolution was simply a minutes resolution, and would not appear in the rules, while the second one would so appear. If so, was it sufficiently definite? Had the Committee power to send a copy of the "Transactions" to each member, if it did not appear in the rules?

The PRESIDENT: They could send a copy to each member as in the past.

The resolutions were unanimously passed.

### REPRESENTATIVE ON INSTITUTION COUNCIL.

The PRESIDENT said the question of selecting a representative of the Association on the Council of the Institution of Gas Engineers had been considered by the Committee, but in circumstances which had arisen they did not feel that they could nominate anyone at the present time. The Committee therefore asked the meeting to give them authority to reconsider the subject at a later date, and then to nominate a representative.

This course was agreed to, on the motion of Mr. C. H. WEBB (Stourbridge), seconded by Mr. W. S. MORLAND (Gloucester).

### THE NEW PRESIDENT.

The PRESIDENT remarked that he had now a very pleasant duty to perform. Twelve months had elapsed since he took the chair, and the time had arrived for him to vacate it. His successor, Mr. Carder, needed no introduction from him. He was well known to everyone in the room; and they retained grateful recollections of the very valuable work which he did on their behalf in connection with the Joint Industrial Council. There were few present that day who were not now deriving benefit from the advice he so willingly gave whenever approached. With regard to Association activities, Mr. Carder had been, as they knew, keenly interested in the work, and since he had been on the Committee he had proved a veritable tower of strength to them. When taking part in their discussions, he had usually put forward constructive criticism, and altogether he had proved himself a gas engineer of great worth. They were honoured in having him as their President, and it was a pleasure to ask him to take the chair.

### THE RETIRING PRESIDENT THANKED.

Mr. C. H. CARDER, of Oldbury, then took the chair, amid applause, and said the first thing he had to do was to propose a hearty vote of thanks to Mr. Langford, their retiring President. This was a proposition which no words of his own were needed to support. Though Mr. Langford had said some very nice things about him, he had as yet done nothing to deserve them; whereas Mr. Langford had at Coventry shown them work of a high order, and had given evidence of administrative control and technical skill which had excited their admiration and envy. In presiding over their meetings, he had displayed a thorough grasp of affairs. This being the case, it was a pleasure to move a vote of thanks to him for his inestimably valuable services during the past year.

Mr. W. E. CATON (Oxford), in seconding, said Mr. Langford had shown them some wonderful works at Coventry, and they had enjoyed their visit there immensely. They had not forgotten the hospitality extended to them by Mr. and Mrs. Langford.

The vote was cordially passed, and Mr. LANGFORD, in response, declared that what little he had accomplished had been done with the greatest pleasure. He gratefully acknowledged the assistance he had received from the members of the Committee and the Hon. Secretary. He had been much gratified that so many members attended the spring meeting at Coventry.

### MR. CARDER'S IMPENDING DEPARTURE.

Mr. CARDER, before proceeding to read his Presidential Address, said reference had already been made to the fact that it was not possible for him to represent the Association for the current year on the Council of the Institution of Gas Engineers. Most of them, no doubt, knew the reason, which was that he had been appointed Chief Gas Engineer to the City of Rio de Janeiro Tramway, Light, and Power Company, and would be leaving for South America within a week or so. He would not at that distance be able to exercise any effective influence on discussions in London. The early date at which he had been desired to take up his new appointment had also prevented him from developing two themes on which he had particularly wished to address them. As members were aware, he had been carrying out at the Oldbury Works a fairly extensive reconstruction scheme. He had

started with coal handling, and finished with the purifiers, and had moved a few things in between. In addition to this, he had been making some experiments—really in amplification of the Fuel Research Board work—on the effect of steaming at different pressures under different temperature conditions; and it would have been interesting to give them the results. Unfortunately, however, there had been trouble with a portion of the retort settings. This had been through no fault at all of the contractors, but it had upset the experiments rather badly during the last two months, and he had not been able to get them completed. This apology, he felt, was due to the meeting, for his omission to address them on a subject which showed distinctive constructive criticism. He then gave the following

## PRESIDENTIAL ADDRESS.

I would like first to repeat the thanks which I expressed at my election last November for the honour you have conferred upon me by placing me in the Presidential Chair. It is a compliment which I much appreciate, and the fact that to-day I say not only *Ave*, but also *Vale*, could not have been foreseen at the time of my election.

I propose for a few minutes to review some of the questions which have recently been occupying the attention of the gas industry. The papers which have been read before the various institutions, and the reports which have been published in the Technical Press during the past year, rather indicate that pride of place must be given to the different questions of making good the leeway in reconstruction and extension of plant, both manufacturing and distributing, occasioned by the past eight or nine years of war disturbance and financial stringency. Much ingenuity was displayed by gas engineers during that time in getting results from plant which normally they would never have attempted to push to such limits; and it speaks well for them and for the plant that such good results were obtained.

### THE QUESTION OF QUALITY.

In some respects the necessity for thus forcing plant has been of incalculable benefit, as it has led to closer investigation of underlying principles, and to the rapid development of progressively more efficient types of plant or methods of control than would normally have been advanced. This development has not been along one line only, but has taken place in many directions, and has served also to emphasize the great diversity in manufacturing processes in use in the industry, even for obtaining results which at first seem identical, and is indirectly a tribute to the vitality of the industry itself. In deciding what scheme shall be put forward in any particular case, many factors have to be taken into consideration. It is generally accepted that the chief requirement is to supply the consumer at sufficient pressure with gas of reasonably constant quality, and of such a nature as will give the maximum efficiency in average appliances; but there is the widest divergence of opinion in the application of every point enumerated in this sentence. "Sufficient pressure" is more or less prescribed by the Gas Regulation Act as any greater than 2 in. of water, but I have recently heard a quarter of this defended as being ample, when we know that for many purposes double that pressure is barely sufficient. The quality of gas to be supplied has probably been more hotly debated during the past two or three years than any other topic in the industry. It is a point not governed by any one factor; and the wide range of calorific values declared shows that full advantage has been taken of plant conditions to carry out the intention of the Gas Regulation Act, and to give the consumer the gas which each undertaking was in a position to produce most economically. Two general points may be emphasized—that too high a declared value definitely limits the type of plant and the class of coal, and that future market conditions may unduly inflate the price of gas to the consumer; and that too low a declared value means a greatly increased storage accommodation, and unduly large distributing mains, services, meters, and house pipes to provide a definite reserve of thermal capacity, and convey it to the consumer in sufficient bulk to be effective for its purpose in a reasonable time. The unduly increased proportion of capital in unremunerative plant is a serious deterrent to the adoption of very low calorific values, even to those who consider that the greater thermal efficiency of production of such gas would justify the provision of burners and cookers of special type.

Experiences during the coal-control period were of great value in determining to what extent existing appliances would deal satisfactorily with gas of lower calorific value than had normally been supplied. In our own case, investigation of the operating costs of existing plant showed that equivalent total heating value could be much more cheaply produced by gas of a lower calorific value; and opportunity was taken to ascertain where the balance of economical production and utilization lay. The gas was steadily but persistently degraded by the reduction of the degree of carburation, and by greater addition of blue water gas. When the calorific value was reduced to 430 B.Th.U. per c.ft., trouble was experienced, and it was found that any further decrease seriously affected the cookers and furnaces on the district. Air adjustments had, of course, been attended to, but below that calorific value the time required for various operations was unduly prolonged. The quality was then brought back to about 470 B.Th.U.; and it was found that the range between 450 and 470 B.Th.U. gave, with the appliances in use in the district, the most satisfactory all-round quality, and one that could be produced at a reasonable cost.

### THE IMPORTANCE OF CONSTANT DENSITY.

One point which was prominently brought out during this experiment was the importance of constant specific gravity of the gas to be supplied. This was in accordance with theory and previous experience, but it is a point that cannot be too strongly stressed. For furnace work this constancy of specific gravity within narrow limits is essential if anything like uniform output is to be obtained. In the case of a furnace for enamelling glassware, for instance, where the difference between the fusion point of the enamel and the softening point of the glass may be as little as 20° C., a slight variation in the density of the gas may easily lead to the spoiling of the whole content of the oven.

Having decided the quality of gas best suited to consumers' appliances, the question arises as to the best and most economical means of producing that gas. The range of choice is a wide one. For high-grade gas horizontal retorts with machinery probably hold the field, but the advocates of short-duration moderately-light charges at fairly high heats look askance at the more recent development of large-section retorts, filled, or nearly so, and running for twelve hours with moderate heats; and each claims that his particular type of plant gives better results than the other. It probably does in some respects, depending on the relative importance of various points. The considerable reductions in the cost of continuous verticals, however, are making them serious competitors even in this field; and the advantages which they have for coke cooling in the retort itself, and the comparative freedom of the men from heat and dust have to be carefully considered. The manning scale for the two systems for the same tonnage of coal per day is approximately the same, and in many cases the deciding factor will be the estimated repair and maintenance charges. For medium-grade gases the field of choice is even wider. Verticals with steaming, straight coal gas with an admixture of blue-water gas, mixtures of coal gas and carburetted water gas, or composite methods based on some of these, give a range for selection which allows for the fullest latitude for meeting vagaries of the market.

The difficulties with a very low grade gas, as I have said before, mostly arise from the high surplus of storage capacity and the much larger distribution system and household meters which are required, if the work of the gas is to be done in a reasonable time at its point of utilization. There are also the physico-chemical losses to be borne in mind.

Having made a decision on general lines as to the type of plant required, questions of the degree to which steaming in verticals pays commercially, as distinct from technically, the relative advantages for various grade gases, of moderate or high heats, the necessity or desirability of employing a more highly silicious material for retort construction, and methods of control of plant operation claim careful consideration. Much valuable work has been done on many of these points, but there is more still to do. The extent to which it is practicable to use breeze instead of coke in the producers for heating the retorts, and the possibility of further fuel and labour economy by the installation of waste-heat boilers on both vertical and horizontal settings, call for attention.

### STORAGE AND DISTRIBUTION.

After manufacturing plant and quality come storage and distribution. The levelling of the load factor by development of the cooking and heating loads has enabled many undertakings with restricted holder capacity to carry on without extensions; but an unduly low storage leads to great anxiety, and a welcome activity in holder construction is noticeable. The problem of distributing mains is, in areas which are industrial or have been developed as housing sites, a very serious one. Usually housing sites have been developed on the fringes of a district, where the existing mains were only provided to suffice for a rural population; and this has in many cases necessitated new trunk mains, either low or high pressure, direct from the works, at very heavy cost. There have, of course, been some cases where the total revenue from the prospective consumption would not suffice to pay the dead charges on the mains required.

Modern methods of road construction for heavy traffic in industrial areas have not helped to keep down the cost of main-laying. Granite setts laid on a bed of concrete 1 ft. thick, with steel reinforcement, make one hesitate to run a main across such a road if it can be avoided; and where old roads are being reconstructed on this principle, it is a matter for serious consideration whether ultimately it would not pay well to remove any existing mains and run a smaller main down each side. The difficulty is that relaying of this nature is very expensive, and there are very few undertakings with sufficient working capital or special renewal funds large enough to meet such an expense.

Another serious problem is the non-registration or slow registration of consumers' meters, especially of the dry type. The Life of Gas Meters Research Committee did very valuable work in investigating this question; but in many cases on the district there is nothing to indicate that the meter is in any way abnormal. Much can be done by oil spraying, but the only really satisfactory way to deal with this question seems to be to have a regular system of changing and testing dry meters.

### CONGRATULATIONS.

Mr. POOLEY, at the close of the address, moved a hearty vote of thanks to the President, and said he did so with very mixed feelings. They were exceedingly sorry that Mr. Carder was

leaving them, but at the same time wished to offer him their most cordial congratulations on his new appointment. He hoped their President would enjoy life at Rio as he (Mr. Pooley) believed life could be enjoyed there. Rio, he thought, was most delightfully situated, though the climate might be somewhat trying. In the name of the Association, he wished Mr. Carder the best of health and prosperity. The address he had given them that afternoon would well repay careful study.

Mr. JAMES PATERSON (Cheltenham) seconded the vote and the good wishes expressed by Mr. Pooley. By Mr. Carder's departure across the water, they were suffering a grievous loss. Personally, he had looked forward to Mr. Carder's Presidency with keen interest—knowing, as he did, his great energy and ability. It must have been a great trouble to him to prepare an address, while making things ready for his early departure abroad.

The vote was passed with acclamation, and acknowledged by the PRESIDENT, who said the address had, of necessity, not been such as he would have liked to give them, but it had been the best he could do under pressure of other business.

### "SOME PROBLEMS AND THEIR SOLUTION."

Mr. C. M. D. BELTON, of Shrewsbury, then read a paper with the above title. This, with a report of the subsequent discussion, follows hereafter.

On the motion of the PRESIDENT, seconded by Mr. LANGFORD, a hearty vote of thanks was passed to Mr. Belton.

### BRITISH EMPIRE GAS EXHIBIT.

The PRESIDENT said they had with them Mr. Mason, who certainly did not need any introduction to a Midland Association meeting They would be glad to hear from him something about gas at the forthcoming Wembley Exhibition.

Mr. W. M. MASON (the Manager of the British Commercial Gas Association) said that he was there deputizing for his Chief, Mr. Goodenough, who was the Executive Chairman of the British Empire Gas Exhibit. They were keen at headquarters to take every possible opportunity of informing the industry as to the progress of the Wembley Exhibit, and also as to the schemes in operation for popularizing gas generally. The need for united strenuous action on the part of the whole industry was imperative. Their competitors were going all out to try to prove that electricity was the cure for all ills; but gas—if full advantage was taken of this splendid opportunity for propaganda—could more than hold its own.

Proceeding, Mr. Mason referred to some of the more important points in the publicity schemes (details of which it is undesirable at the moment to publish), and also, in answer to queries raised by members, stated that there would be no legal difficulties as to urban district councils contributing to the Exhibition Fund. He read the following extract from Official General Regulations published by the Exhibition Authorities—

> 33. *Exhibitors' Trading Accounts and Inland Revenue.*—It is understood that the Inland Revenue Authorities, in dealing with trading accounts submitted to them by exhibitors, will treat the cost, as and when incurred, of participation in the British Empire Exhibition including any expenditure under the guarantee, on the same lines as the cost of advertising generally, and in normal cases will take no exception to such expenditure being admitted as a deduction.

As regarded the Midlands, Mr. Mason added, out of a possible subscription total of £11,329, practically 56 p.ct. had been promised. This meant that, as a district, a good deal still remained to be done to secure complete support. Samples of the posters and literature to be issued were exhibited at the meeting.

The PRESIDENT remarked that they very much appreciated Mr. Mason's presence, and could assure Mr. Goodenough that he had a most efficient deputy. The Wembley Exhibition was one in which they were all interested.

### TEA AND FAREWELL.

At the close of the meeting, the members were entertained at high tea by the President.

Mr. MORLAND took the opportunity to express their regret at losing Mr. Carder, and again to wish him every success in his new sphere of action. In the country to which he was going he would doubtless have fine chances. They were much indebted to him for his hospitality, and he proposed a vote of thanks to him for this.

Mr. HAROLD DAVIES (Chesterfield), seconding, remarked that Mr. Carder deserved success, for he had worked for it with indomitable perseverance.

Mr. CARDER, in acknowledgment, spoke of the regret he felt at not being able longer to occupy the Presidential Chair.

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**Will.**—Sir Henry Kimber, whose death occurred last December, left £394,567 (net £314,215).

**Coal Tar Products.**—The Board of Education have now issued the Report of H.M. Inspector on "Instruction in England in the Manufacture and Applications of Coal Tar Products," based partly on visits to classes in chemistry and cognate subjects during the past four years, and partly on the knowledge one of the Inspectors gained through experience of manufacture. Copies (6d. each) may be had from H.M. Stationery Office, Imperial House, Kingsway, W.C. 2.

## SOME PROBLEMS AND THEIR SOLUTIONS.

By C. M. D. BELTON, of Shrewsbury.

**[A Paper read before the Midland Association of Gas Engineers and Managers on Thursday, March 13.]**

When your Secretary asked me to contribute a paper at this meeting, I agreed with a certain amount of diffidence, knowing the high level of previous communications. However, during the short time at my disposal I have endeavoured to collect a few notes which I trust will be of some little interest. On this occasion I am drawing upon experiences in general, rather than upon any particular matters of research. I must apologize for hiding behind a title which seems vague, and ask your forgiveness if it appears to have been misleading.

I suppose the predominant desire of every gas engineer of the younger generation is to have an opportunity of designing and laying out a new works on a site of his own selection, and then to incorporate his own ideas of the types of plant requisite for the ideal works. To very few, however, do such opportunities present themselves. Most engineers at some time or other are faced with the problem of modernizing the whole or part of an old works, and such problems call for very careful consideration of a variety of concomitant local circumstances.

### SITES AND CIRCUMSTANCES.

The commencement of the great war found the Company I have the honour to serve in possession of two distinct works, upon sites almost adjoining, yet very effectually and permanently separated; the only direct connection being two 20-in. mains underground—one for gas, and the other containing sundry smaller pipes. The newer works was equipped with inclined retorts and orthodox plant of a rated capacity of half-a-million cubic feet per diem. The older works contained a retort-house with thirteen generator settings of six through horizontals, and no stoking machinery of any description. The remainder of the plant was capable of dealing with a million cubic feet per diem. The much-needed modernization of plant was further postponed owing to the exigencies of the war, and in consequence our difficulties accumulated, costs increased, and maintenance of plant and service became a nightmare.

### CHOICE OF CARBONIZING PLANT.

Immediately after the armistice, however, it was imperative that something should be done without delay. Two courses were open—viz., (1) to extend or replace the inclined retort bench and auxiliary plant at the newer works, or (2) to modernize the carbonizing plant only at the older works. Eventually the latter course was decided upon; the determining factors being lower capital expenditure, larger saving of labour, and shorter period for completion—combined with the fact that the shutting-down of the newer works during reconstruction was impracticable. Room was first found for a carburetted water-gas plant of 300,000 c.ft. capacity in the old horizontal retort-house, but there was no room for a special boiler to serve this plant. The old works low-pressure Cornish boilers were therefore replaced by two Babcock and Wilcox water-tube boilers, giving 120 lbs. per sq. in.; the old boiler shells, after withdrawal of the fire tubes, being commissioned as gas-oil storage tanks.

As it was impossible to find room for a separate purification plant for carburetted water gas, the smallest existing gasholder was made the relief holder, and connected by a single main with the carburetted water-gas condenser; a valved connection from this main being made with the inlet main to the coal-gas exhausters. Thus the relief holder stores unpurified carburetted water gas, and the valve to the exhauster main is adjusted to draw a steady average make. This arrangement is of necessity a make-shift, and naturally the exhauster vacuum chart is a somewhat thick line; but the regulation of the exhauster was facilitated by substituting a lighter flywheel, which enabled the steam governor to work more effectually and speedily.

The carburetted water-gas plant, working continuously in conjunction with the inclined plant at separate works, enabled us to carry on until the vertical installation was completed in March, 1921. A vertical retort installation was decided upon for three special reasons: (1) A plant to produce 750,000 c.ft. per day could be accommodated on half the ground space occupied by the horizontal retort house; and this was done by removing seven of the horizontal settings down to the foundations, taking down the roof over this portion, raising the walls of the retort-house with brick-filled steel framing, and roofing upon new semi-principals resting on the coal bunkers; (2) generator settings with power-stoking machinery would have been quite as costly, as it would have been necessary to raise the walls and roof of the whole of the retort-house in order to accommodate the plant, and the site is so cramped that it would have been impossible to find room for a power house; and (3) it was felt that the gas produced by vertical retorts with intimate steaming was destined to be the most economical and serviceable in future. The vertical retort installation, with power plant, and also the separate carburetted water-gas plant, are all accommodated upon half the ground space occupied by the old horizontal retort-house, leaving the remainder of the old house available for other purposes.

After only about one month's experience with the new vertical plant came the great coal dispute. We were able to make the

most of our stock of coal; but the abominable rubbish that was sold as fuel towards the end of the stoppage gave us endless trouble and poor results. However, the supply of gas was never cut off, though sometimes it was painfully attenuated.

### Control of Operations.

Emergency legislation had provided us with a calorific standard of 450 B.Th.U., and one of the problems to be faced was the ultimate standard to be selected in conjunction with our application for an Order under section 1 of the Gas Regulation Act. Although in former normal times it was impossible to consider anything below 550 B.Th.U. with inclined and horizontal retorts, yet the stripping of the gas for benzole production had reduced the value to 450 B.Th.U. for some considerable period, and the great majority of consumers' appliances were adjusted for the use of this quality of gas. Therefore it was decided to declare a value of 450 B.Th.U., and to produce this quality by intimate steaming in vertical retorts.

I determined that the plant should have regular scientific control, so that constant results should be obtained. Daily pyrometrical readings of all the combustion chambers are taken, and slight adjustments made accordingly, in order to maintain the temperature at an average figure of 1340°. Between the limits of 1320° and 1360°, we found our results to be the most satisfactory from every point of view; the collateral conditions for these results being a throughput of 4 tons per retort, with steam at 16 lbs. pressure, through $\frac{5}{32}$ in. diameter nozzles at the bottom of the retort, together with an additional jet through $\frac{1}{8}$ in. diameter nozzles in the coke chamber.

The mixed coal gas and water gas thus produced is of a satisfactory composition, and daily analyses are made to detect any variations. A $CO_2$ recorder is in constant use upon the make of gas, and serves the useful purpose of checking steaming efficiency. I have not seen my way clear to adopt steam meters in connection with vertical retort working, owing chiefly to the fact that these instruments are not yet adaptable to the peculiar conditions obtaining on such a plant; but a simple pressure gauge to each six retorts enables the consumption to be estimated fairly accurately, and a steam pressure recorder is a valuable addition. By these means the operations of the reducing valves are checked, and any temporary obstruction of a steam nozzle is shown, and can be attended to.

In computing steam consumption, one is brought face to face with the fact that expert investigators have not quite corroborated each other's conclusions. However, the chart given in the Fourth Report of the Gas Investigation Committee is a useful guide, and is certainly nearer the truth than any of the published formulæ.

### Working Results.

*Results per Ton of Coal (Wet Basis).*

| | |
|---|---|
| Duration of test in days | 7 |
| Coal carbonized in tons | 308·15 |
| Steam admitted to retorts | |
| Diameter of nozzles | bottom $\frac{1}{4}$ in.<br>top $\frac{5}{32}$ in. |
| Pressure on nozzles in lbs. per sq. in. | 16 |
| Total steam used in tons | 55·21 |
| Total steam p.ct. on coal used | 17·91 |
| Total steam in coke in tons (coke equals 65 p.ct. of coal) | 2·80 |
| Total steam available in tons for conversion | 52·41 |
| Net steam p.ct. converted on coal used | 17·01 |
| Coal carbonized per retort per day in tons | 3·95 |
| Total gas made in c.ft. (not corrected) | 5,634,100 |
| Gas in c.ft. made per ton of coal | 18,284 |
| Composition of gas—volume p.ct.: | |
| $CO_2$ | 3·8 |
| $C_nH_n$ | 2·1 |
| $O_2$ | 0·6 |
| CO | 19·9 |
| $H_2$ | 51·0 |
| $CH_4$ | 17·8 |
| $N_2$ | 4·8 |
| (Total inerts | 9·2) |
| Estimated C.V. | 451·8 |
| Calorific value of gas in B.Th.U. per c.ft. (gross) | 457·1 |
| Thermal value of gas in millions B.Th.U. (gross) per ton of coal | 8·358 (or 83·58 therms) |
| Gas in c.ft. made per retort per day | 72,222 |
| Thermal value (gross) of gas in millions B.Th.U. per retort per day | 33·013 |
| Sulphur in grains per 100 c.ft. in purified gas | 19·48 |
| Average temperature of combustion chamber | 1345° C. |
| Average temperature of top waste heats | 850° C. |

Coal analysis (average)—

Proximate analysis.

| | P.Ct. |
|---|---|
| Moisture | 5·5 |
| Organic volatile matter | 30·8 |
| Fixed carbon | 55·8 |
| Ash | 7·9 |
| | 100·0 |
| Organic volatile matter calculated on ash-free dry coal | 35·6 |

In order to realize the best results with vertical retorts, it is recognized that close and constant technical supervision must be exercised, and this to a greater degree than with older types of plant. The mixture of coal elevated to the hoppers each day must be regulated, for coals from different fields require varying treatment, and if these are taken indiscriminately a chaotic state of affairs will quickly occur in the retort-house. Proper control, however, undoubtedly pays, owing to the avoidance of waste.

### Elimination of Waste.

The mention of waste raises the pressing question of its elimination in every possible way. Considerable progress has been made in the design and use of waste-heat boilers in connection with vertical retort settings, and they serve a very useful purpose so long as there is no deliberate extravagance of fuel in maintaining sufficient volume of waste gases at the requisite temperature. Unfortunately, I cannot yet speak from experience regarding the use of waste-heat boilers, but the subject has been fully dealt with in the technical papers.

One of the greatest handicaps to economical working to-day is the large amount of inert matter received with coal from many collieries, and our apparent powerlessness in obtaining rectification. If it was merely the financial loss of paying for incombustible fuel and its carriage, compensation might be obtained; but as gas-works do not usually possess the means for picking or washing coal, this accompanying inert matter enters the retorts, depreciates their productive capacity, reduces the quality of the coke, increases clinkering troubles in the furnaces, adversely affects carburetted water-gas plant results, and also annoys coke consumers.

A fair average figure of ash in the coal received from ten different collieries is 8 p.ct. Now allowing 3 p.ct. as reasonable—which figure, however, is only maintained by one colliery—there is a balance of 5 p.ct. of inert material constantly being received and dealt with. Let us see what is the financial consequence in a 100-ton parcel—

| | £ | s. | d. |
|---|---|---|---|
| Railway carriage of 5 tons at average of 4s. | 1 | 0 | 0 |
| Cartage and handling of 5 tons at average of 1s. 6d. | 0 | 7 | 6 |
| Loss of 18,000 c.ft. of gas per ton, at 2s. 10d. | 12 | 15 | 0 |
| Loss of 12 cwt. of coke per ton for use, at 30s. per ton | 4 | 10 | 0 |
| Loss of 15 gallons of tar per ton, at 4d. per gallon (not including waste labour, &c.) | 1 | 5 | 0 |
| | £19 | 17 | 6 |

or 3s. 11d. per ton, or 12·4 p.ct. of the cost of coal.

What is the solution to this problem?

In these days, when coal is double pre-war price, and the public expect gas to be down almost to its old figure, undertakings must needs extract the utmost from their raw material, and I grudge every atom of volatile matter left in the coke. The following analysis is taken in conjunction with carbonizing results already given.

*Analysis of Coke (Average).*

| Approximate Analysis. | P.Ct. |
|---|---|
| Moisture | 1·4 |
| Organic volatile matter | 1·7 |
| Fixed carbon | 84·5 |
| Ash | 12·4 |
| Carbon in ash-free dry coke | 98·0 |
| Calorific value of coke | 12,400 B.Th.U. per lb. |

Another waste problem is that of pan ash. With the increasing volume of gas produced per ton of coal carbonized, there is a collateral decrease in the quantity of coke available for sale, although the demand for this fuel is well maintained. Consequently, boiler furnaces must be adapted to burn the residue of coke gradings and the recovered coke from pan ash, in order to leave a greater proportion of saleable coke for the public. There are three general types of pan-ash separators on the market; one using a cascade of water, another employing a slurry of adjustable specific gravity, and the third a sectionally-magnetized drum. All these are costly machines, and each of them has some inherent imperfection; but they certainly provide means for effecting recovery of usable fuel which would otherwise be wasted where merely hand-picking is employed. The only danger in their adoption is that there may be a tendency to extravagance in shaking-up and clinkering the retort furnaces.

Now a word as to the consumer's appreciation of present-day gas. Some, perhaps, will say that it is non-existent, or even negative; but I venture to assert that, where a supply which is reliable as to quality and pressure is combined with an efficient outdoor staff, the service rendered by the gas undertaking is being acknowledged, more or less gratefully, to an increasing extent. This ideal of service should really animate us all; and it is only by an increasing recognition of this upon the works, as well as upon the district, that we shall retain the confidence of the public to the extent merited by the high importance of the industry in the nation's life.

### Discussion.

The President (Mr. C. H. Carder, of Oldbury) said they were very much obliged to Mr. Belton for his extremely interesting paper—a remark with which subsequent speakers heartily concurred.

Mr. P. N. Langford (Coventry) said that on some points he agreed with the author, but on others he did not see eye to eye with him. In the paper, he gave the average temperature of the combustion chamber as from 1320° to 1360°. Was this tested at one particular point, or was it the average temperature throughout the combustion chamber?

Mr. Belton: It is at one particular point.

Mr. Langford, referring to the question of steam meters, said he had thought of adopting them with his installation, but readily agreed there were inherent difficulties with them in the circumstances in which they were used with vertical retorts; and he decided instead

to measure the feed water going into the waste-heat boilers. Where one had waste-heat boilers or separate boiler installations, it was better to do it in this way. With regard to the working results, could the author tell them, under the conditions in which this test was taken, what the fuel consumption of the producers would be?

Mr. BELTON: 16·75 p.ct., or 3·3 cwt.

Mr. LANGFORD congratulated the author on his analysis of the gas, but asked whether the composition of the gas was taken over a long period—say, 24 hours—or whether it was a spot test, because from his own small experience with vertical retorts he found that the composition varied considerably.

Mr. BELTON: It is an average sample.

Mr. LANGFORD remarked that he had not yet had a test returned to him which showed such a low content of inerts. The figure of 9·2 was extraordinarily good; and this was a point which would be useful to him, because he would want to know the reason why his own works did not get down to it. Their inerts ran to about 13·2. A point with regard to which his experience did not coincide with that of the author was the selection of coal for verticals. At Coventry they had coal from 25 collieries, from the three districts of Yorkshire, Derbyshire, and North Staffordshire; and when they started up the verticals, he made up his mind that in no circumstances would he give the vertical retorts a preference in coal. He had followed this throughout. They had been working them now for twelve months, and the coal from the 25 collieries was put up to the vertical retorts just as it came in, without any discrimination. The reason why they had had no trouble, he thought, was that the men, when commencing on the work, had to adapt themselves to the varying mixtures of coal; and the plant being under technical supervision—which, as the author said, was most important with vertical retorts—the work had been carried out as a matter of routine. If one selected coal for a particular installation, the slightest variation, after the men had got accustomed to that coal, caused trouble. In connection with the waste problem, Mr. Belton had alluded to the extraction of coke from pan ash. As he had said, the plants were costly. At Coventry several years ago they had installed a plant working on the flotation principle; but this had been shut down, because they found the value of the coke recovered did not pay for the running of the plant and the wear and tear. The direction in which to look for saving was in the use of the most efficient grates for the retort settings. He thought he had mentioned last year in his address that, as the result of doing this at Coventry, they had saved something like 78 tons of coke per furnace per annum. One had to look at the question of mechanical plant for this purpose very carefully before launching out.

Mr. JAMES PATERSON (Cheltenham) was fully able to sympathize with the author in the position in which he found himself at the commencement of the war. In the undertaking of which he was in charge they also had two works—one old and one new—and he had bitter recollections of the increasing cost of maintaining the plant at two different works when one might have sufficed, had it been possible to concentrate on one site. He had put in an installation of vertical retorts, but his experience had been so short that he could neither confirm nor contradict the author's excellent experimental working. He was, however, in spite of Mr. Langford's remarks, rather inclined to agree with Mr. Belton in the matter of coal. In his own installation, they had the hottest section of the retorts built of silica material, so that they had been able to run at higher temperatures than Mr. Belton; and he should imagine that the Cheltenham results, if they were available, would probably prove even better than the author's, owing to this higher temperature in the combustion chamber. Mr. Belton was to be congratulated on the analysis of his gas. A figure of 9·2 for total inerts was very low. He himself was rather in the position of Mr. Langford, of having a figure of about 13 p.ct. The author's remarks on the subject of waste were very interesting. His point was that if one put a ton of coal into a retort, and 8 p.ct. was rubbish, there was a loss on the carbonizing; and it was this loss due to the presence of inert matter that they must take the strongest steps to get the collieries to eliminate. Operations at the pit head could be—he did not say that they were, but they could be—carried out in a very perfunctory manner, and so trouble would arise here, or might even come from the working face itself. A good deal depended on whether the coal was forked or shovelled into the tubs. Continued efforts must be put forth by all users of coal—particularly by those who had to carbonize it—to persuade collieries to supply it as free from inerts as possible. It was not good business to send out coal containing much inert matter. If a determined effort was made by one and all, this subject would receive more careful attention in the future.

Mr. F. SHEWRING (Stratford-on-Avon) asked the author whether he had found any difference in the water gas obtained by steaming when using different types of coal. Had there been any difficulty with some classes of coal in maintaining this high percentage of CO in the gas? Also had he noticed any effect when steaming if the vacuum or pressure in the retort were varied?

Mr. BELTON replied that, with regard to different classes of coal and the effect on the water-gas reaction, this largely depended on the physical structure of the coke. The steaming conditions needed to be altered if one got an excess of a coal of a very high caking property. This was where the difficulty of the mixing problem came in. Mr. Langford was obtaining coals from 25 collieries, so that they were more or less automatically mixed; and with a large installation such as he had at Coventry, he was able to deal with the top portion of the working by means of a special staff. With a smaller installation, however, the same staff dealt with both top and bottom working, and, to ease their labours, it was necessary to consider them to some extent. They found that the best method of working was to keep about half-a-tenth of vacuum at the tops, and then, with the steam coming into the bottom, as nearly as possible the pressure conditions were level gauge, unless anything untoward was happening in the retort. Increasing the vacuum at the top of the retort did not make any improvement in their results; and, of course, this had a bearing on their figure of inerts. In addition, one had to keep the ironwork top and bottom quite tight. These things were all more or less related.

Mr. W. E. CATON (Oxford) said there did not appear to be any intimation of the quantity of coke made for sale per ton of coal. It was all very well to say one got 18 284 c.ft. of gas to the ton and, he would assume, 8 or 9 cwt. of coke; but probably the net cost of the gas was higher than it would be if one were to make 15,000 c.ft. of gas and 12 cwt. of coke, as was customary with horizontal working.

Mr. BELTON replied that the coke produced in the ordinary way they reckoned at 13 cwt. Steaming took approximately 1 cwt., the furnaces 3·3 cwt., other purposes 1·4 cwt., and sales 7·3 cwt.

Mr. SHEWRING: Has Mr. Belton noticed any physical change in his tar?

Mr. BELTON replied that the tar, of course, was of a more fluid nature generally speaking. At one period they were troubled with rather an excess of water, but now they had got to their regular standard working they were keeping it down to the 5 p.ct. figure. They could not get it below this.

Mr. SHEWRING inquired whether it had affected the ammoniacal liquor.

Mr. BELTON: Not to any appreciable extent. The liquor is 8 oz., and we get, I think, 41·7 gallons, and 18 gallons of tar.

Mr. C. H. WEBB (Stourbridge) said that with regard to the mixture of the water gas and the coal gas, the relief holder generally did store unpurified carburetted water gas, and he did not think the method of mixing was usually looked upon as a makeshift. It seemed to him that there should be no trouble, so long as the percentage was kept fairly constant. Later on, the author said that generator settings with power-stoking machinery would have been as costly. He was just a little surprised at this statement. He should not have thought that machine-stoked retorts, with hoppers and so on, would come out quite as expensive as a vertical retort installation. As to combustion chamber temperatures, he had been running a vertical retort installation for about two years, and worked at about 1290°. This was the temperature taken with a disappearing filament pyrometer looking down from the operating stage into the combustion chamber. With regard to steam meters, he did not think they were at all necessary. There was a standard size of metal nozzle a short distance from the retort, and a fireclay nozzle admitting steam to the retort. On the pipe between the two nozzles he placed a T with a tap, and he fitted a mercury gauge on there—opening the tap to see what the pressure was. He found, on the average, that the plant was working well when the pressure there, with the nozzles they used, was somewhere between 1 in. and 2 in. of mercury. If there was less than that at this point, it would indicate that the metal nozzle before the gauge was stopped up, and the proper supply of steam was not coming through. If, on the other hand, there was considerably more pressure than he had named, it would show that the fireclay nozzle or the pipe beyond the gauge was stopped up. As the trouble was mainly through the stoppage of the metal nozzles from scale accumulating, if the pressure was below the average one would argue that the nozzle had been stopped by scale, and this he had generally found to be the case. He worked a so-called mixture of ten coals, but day by day it did not work as a mixture. One might get a string of seven or eight wagons from the same colliery, and the coal would all go up to the hoppers at once; and as the hoppers were kept full they reckoned it was about 55 hours after a truck-load went up that the results began to show. So they just took a record of the time when the truck of coal was dropped into the breaker, and if there was trouble they looked back to see what it was that had gone up from 55 hours to 60 hours before. They did not get as much as 15 gallons of tar; their figure was about 13½ gallons. The tar was very different, of course, from the horizontal retort tar—particularly in the matter of the carbon. There was very little free carbon; but although the specification mentioned free carbon, the road surveyors did not seem to worry about it very much, so long as the tar was satisfactory in other ways. He quite agreed that if one tried to give good service the consumer gradually came round to appreciate it. Some time ago he had noticed put forward as a slogan: "The consumer is always right." His undertaking had started to act on this, and it was a first-class attitude to adopt. If they only took the trouble, they could make a friend of the average consumer, who went away satisfied if he felt the undertaking was trying to do a straightforward job.

Mr. F. C. BRIGGS (Dudley) congratulated Mr. Belton on having had the courage to put down verticals when he did. Of course, every year that went by needed less courage to adopt this system. He himself had recently had to look into the question of the extension of plant. But in his case it was more a question of getting the price of gas down than of increasing capacity. They decided that better plant had to go in, and looked into every type that could be installed. They had carburetted water gas plant and inclined retorts, and they considered machine-stoked horizontals and verticals. It was proved that a vertical retort installation, in his own case, run by steam engines with waste-heat boilers, was distinctly cheaper in capital cost for the same output than the machine-stoked horizontal system, where one had to put down a generating plant to work it. He quite agreed that the question of putting down mechanical plant to deal with pan ash had to be looked into very closely, and he did not think it would pay to instal unless one could be sure of a good market for the clinker.

The PRESIDENT heartily endorsed what Mr. Webb had said about service to the consumer. It did pay to go out and hunt for trouble. As had been very rightly said, the complaints that mattered were those they did not get. The discussion had shown that Mr. Belton's results compared very favourably with those of other plants of approximately similar type. His analysis of gas was an improvement on what it had been possible for him (the President) to attain with his vertical plant. Like Mr Langford, his inerts had been 13·1 and 13 respectively for the last two weeks, and he could not recall a week when he had had an average of 9·2.

Mr. BELTON said Mr. Webb had referred to the method of mixing water gas with coal gas, but perhaps he might point out that there was only one pipe from the generator to the holder, and he took his supply to the exhauster from that. This rather accounted for the fluctuations. With regard to the selection of plant, peculiar local circumstances had to be considered. In his case, the very restricted site meant absence of freedom in choice of design. As to inerts, the analysis given in the paper was a sample of what he got continually. It was common practice to have them round about that figure.

# THE RECOVERY OF BENZOLE AT GAS-WORKS AND COKE-OVENS.

### Extracts from Two Valuable Papers.

At a meeting of the Chemical Engineering Group of the Society of Chemical Industry held at the Engineers Club on Friday, March 7, two papers were read dealing with both the theoretical and the practical side of the recovery of benzole at gas-works and coke-ovens. Mr. J. Arthur Reavell (Chairman of the Group) was in the chair.

The first paper, by Major V. F. Gloag, D.Sc., was entitled

## ACTIVATED CARBON.

The author gave a description of the Bayer activated carbon process. Up to date, plants have been built for the recovery of 8500 tons of solvent per annum, but as a considerable number of these plants have only come into operation during the last few months, only 1800 tons of solvent were recovered in 1923. In this figure is included 900 tons of benzole and 500 tons of alcohol, the other solvents recovered being ether, acetone, benzene, trichlorethylene and pyridene. It was only in 1923, when the experimental work had been finalized at Leverkusen, that plants were erected for the recovery of benzole at gas-works; and the actual capacity at work and in course of construction amounts to 1900 tons of benzole per annum. The extended application of activated carbon for this purpose in America is well known, but actually in Europe there are at the present time plants at work and in course of construction of approximately 5000 tons of gasolene per annum; and during 1923, 1050 tons of gasolene were recovered from natural gas by the Bayer process. These figures undoubtedly showed the rapid strides that the application of activated carbon to industry is taking.

In the description of plants the author dealt with them in the following order:

(1) The recovery of benzole in gas-works after the gas has been purified by means of bog ore.
(2) The recovery of solvents from solvent-air mixtures in works where solvents are used during the process.
(3) A description of the plant at Huls which will shortly be put into operation for the extraction of benzole from coke-oven gas, together with the extraction of sulphur.

With regard to the recovery of benzole in gas-works practice—that is, after the gas has been purified by bog ore—plants are in operation at Bernau, Insterburg, Dessau, Leverkusen, and Grenoble, and one is in course of construction at Flonheim. The Leverkusen plant is the one on which the experimental work was carried out. The capacity of this plant is about 2000 to 4000 cub. metres of gas per day, and consists of two filters, 1 metre in diameter and 1 metre in depth, each containing approximately 250 kg. of "T" carbon. ["T" carbon is a development of the original activated material which was made during the war from decolorizing carbon.] This plant has been fully dealt with in Dr. Engelhardt's paper on the "Recovery of Benzole from Illuminating Gas." After the oxide purifiers there is a pre-filter packed with "B" carbon (a material not active to highly volatile solvents) which arrests any naphthalene and tar fog that may have passed the purifiers. This is renewed every eight weeks, and the naphthalene is recovered by heating the carbon in retorts, the carbon being re-activated by carbonizing to a temperature of 900° C. There is a loss of carbon in this process, but it is now proposed, when dealing with large quantities of material, to wash out the naphthalene with benzole and to steam out to remove this benzole. This benzole is being used in motor-cars, &c., without filtering. Since modification of the steaming arrangements was made, which was some six months ago, about 100 absorption and steaming periods have taken place, and there is no evidence that the carbon has lost any activity.

The plants at Bernau and Flonheim are of the one-filter type, and have a capacity of a minimum of 2000 cub. metres of coal gas per 24 hours. The filter is 1 metre in diameter by 1 metre deep, and is charged with "T" carbon. The adsorptive capacity of each absorber is about 60 kg. per day. When the filter is being steamed out and re-activated—a process which takes 1¼ to 1½ hours—the gas is by-passed. This filter is fitted with coils, and on steaming indirect steam is first used to bring the temperature of the coal to a predetermined figure, and then direct steam for complete denudation. The benzole and water driven out are condensed in an ordinary serpentine condenser, and passed through a separator to the storage.

It is interesting to note that these plants are all arranged so that the vapours from the storage tanks, benzole separators, sight glasses, &c., can all be carried back to the gas stream, so eliminating possible loss of benzole.

The plants at Insterburg and Grenoble are of the three-filter type, each coal filter being 1·2 metres in diameter by 1 metre deep. The quantity of gas capable of being treated is some 12,000 cub. metres per 24 hours, the benzole capacity being 360 kg. per day. Though arrangements here are made to by-pass the gas should it be necessary, actually this is not done, for when a filter has taken up the requisite quantity of benzole, as shown by the flame test, another filter is put on. On benzole plants there is no need to dry the filter out or cool by air, for, with correct steam conditions, the coal will only contain 5 to 10 p.ct. of moisture, which is not injurious to benzole recovery. The coal is cooled by debenzolized gas.

A description was also given of an alcohol recovery plant extracting alcohol from an alcohol-air mixture containing approximately 20 grammes of alcohol per cub. metre. There are fourteen filters of 6 cub. metres capacity in this plant, which is designed for the recovery of 7000 kg. of alcohol per 24 hours. The method of operation is to pass the gas containing the alcohol up through the filter, but later plants are mostly arranged for the gas to pass down the filter. The reason for this is that in the upward flow the carbon tends to "dance," whereas in a downward flow this does not occur. The alcohol is extracted and the filter steamed out by direct steam at a pressure before expansion of 5 kg. per sq. cm., and at a temperature of 130° C. During the adsorption period the temperature rise of the carbon is some 20° to 30° C. The filter is steamed out until the temperature at the bottom reaches 110° C., and the carbon is then dried out with hot air until a temperature of about 70° C. is reached. The filter is then blown cold with cold air, and is ready to treat more gas. The plant has been in operation for over 15 months, and no deterioration in the activity of the carbon has yet been noticed. Tests show that over 95 p.ct. of the alcohol going to the plant has been recovered in the form of absolute alcohol during this period. A very fine plant is in operation at Bayer's Cellite Works at Elberfeld, where benzole and traces of alcohol are being extracted from a solvent-air mixture. It has been in operation for over 15 months, and has given excellent results.

One of the most interesting developments in the application of activated carbon is the extraction of $H_2S$ from coke-oven gas, which is equally applicable, of course, to the extraction of $H_2S$ in gas-works practice. The experimental work on this process has been carried out by Dr. Engelhardt at the Leverkusen Factory. On the results obtained at this experimental plant, a full-sized plant was erected at the Auguste Viktoria coke-ovens to deal with 100,000 cub. metres of gas per 24 hours, with a possibility of dealing with 300,000 cub. metres. The arrangement of piping is such that all the gas passes through the pre filter first, and can then pass through the sulphur filters and so on to the benzole filters, or it can go to the benzole filters direct and then, if necessary, back to the sulphur filters.

Coke-oven gas and coal gas contain a certain percentage of oxygen and traces of ammonia, and when these, together with $H_2S$, come in contact with activated carbon, given the correct partial pressure and conditions, &c., the carbon appears to act as a catalyst and brings about the complete decomposition of all the sulphur present in the gas in the form of $H_2S$.

The author expressed himself optimistic enough to think that the results obtained at the experimental plant at Leverkusen will be fully confirmed on a big plant of a capacity of 100,000 cub. metres, and that if this is so it will revolutionize benzole recovery and give another bye-product in the form of pure sulphur.

## SILICA GEL AS AN INDUSTRIAL ABSORBENT.

In the second paper, the author, Prof. E. C. Williams (Ramsay Memorial Chair of Chemical Engineering, University College, London), gave an interesting account of work done for the National Benzole Association. The work reported in the paper was carried out on behalf of the Joint Research Committee of the National Benzole Association and the University of Leeds, and it is by the permission and courtesy of that Committee and of the Executive of the Association that the results obtained are now made public. At the time when this work was commenced some two years ago, proposals had already been made in America for utilizing the known adsorptive properties of silica gel for industrial purposes, and patents for its manufacture and use had been taken out in the names of Patrick and others. There was no evidence, however, that any successful industrial process had been worked out, or, indeed, that the problems of benzole recovery had been investigated at all. It was decided to investigate the problem from the beginning, and the conclusions arrived at are therefore independent of any claims put forward by the American Corporation who are now developing the industrial applications of this substance.

A short review was first given of the mode of preparation and properties of organic gels. The immediate problem before the National Benzole Association was the possibility of using solid adsorbents in lieu of wash oil for the recovery of the condensable hydrocarbons from coal and coke-oven gases. The use of active charcoal and various inorganic gels was considered, and silica gel was chosen for first investigation because of certain definite advantages which it appeared likely to possess. Coke-oven gas contains many impurities likely to affect or destroy the adsorptive power of solid adsorbents, chief among which are the presence of tar fog in the form of a fine suspension; the vapours of high-boiling hydrocarbons, or of compounds which tend to polymerize to high-boiling resinous substances in the body of the adsorbent, which would not be removed by the usual processes of distillation; and sulphur compounds, including hydrogen sulphide, which might act upon the material of the adsorbent. The possibility of contamination with resinous organic matter demands that the adsorbent should be able to withstand heating in an oxidizing atmosphere to a temperature sufficient to burn off such organic compounds and the deposit of carbon which is formed in the pores of the adsorbent during the initial period of heating.

Ferric hydroxide gel, a substance of similar structure to silica gel, was found to be unable to resist the high temperatures involved; it broke up completely to a finely powdered oxide which showed no adsorption capacity. There is also the danger that such a metallic hydroxide gel, even if able to withstand high temperatures, would be acted upon by the hydrogen sulphide in the gas. Active charcoal is at a disadvantage when heating in an oxidizing atmosphere to a temperature of about 600° C. is involved. This disadvantage might be obviated by carefully purifying the gas before passing it over the charcoal. Silica gel is commendable on account of its chemical inertness and its ability to withstand high temperatures. These two factors counteract to a great extent the undoubted superiorities which active charcoal possesses, particularly its greater adsorptive power for vapours at low concentrations, and its selective adsorption of hydrocarbons in preference to water vapour.

The paper then gave detailed results of a large number of investigations which warranted a trial of silica gel as an adsorbent for motor benzole production on a large scale. The main points in favour of such an adsorbent in place of wash oil appeared to be:

(1) Adsorption of 10 p.ct. by weight or about 11·5 p.ct. by volume of hydrocarbons, as compared with 3 to 4 p.ct. by volume usually obtained with wash oil.
(2) Complete recovery of the useful hydrocarbons, very rarely obtained with wash oils.
(3) A crude oil free from low-boiling "prebenzole" and uncontaminated with high-boiling creosote oils, except for the small amount adsorbed from the gas.
(4) The possibility of eliminating all chemical cleaning processes, and particularly the sulphuric acid treatment.
(5) A saving, consequent on (4) of 5 to 10 p.ct. of the crude spirit.
(6) Avoidance of the nuisance and waste arising from the acid sludge produced by acid refining.
(7) A complete removal of naphthalene from coal gas is incidental to benzole recovery. This is of considerable importance to the manufacturers of coal gas for town distribution. If desired, a very small silica gel plant could be arranged to remove all naphthalene without stripping the gas of benzole.

It was at this stage that the author was approached by Mr. J. A. Reavell, of the Kestner Evaporating and Engineering Company, the concessionaires of the Silica Gel Corporation, Baltimore, who informed him that they were about to carry out semi-large scale trials on the recovery of motor spirit from coke-oven gases by silica gel adsorption. The National Benzole Association were invited to send representatives to investigate these trials, and Mr. Basil Sadler and Prof. Williams, together with Mr. Reavell, visited America during June and July last. The remaining portion of the paper is devoted to a description of the trials carried out during this period.

The Silica Gel Corporation had during the past four years been experimenting on the industrial application of silica gel to the recovery of vapours and for the treatment of liquids. For the adsorption of vapours a bed-type absorber containing static beds of granular gel was originally proposed, and is still recommended for certain purposes. Where large volumes of gas are to be handled, however, a continuous circulation plant is used. In this case the gel is finely pulverized to about 200 mesh, and is circulated with the gas, which, by means of a pump, is maintained at a velocity sufficient to carry the gel along with it. Adsorption is carried out in vertical adsorbers consisting of nests of tubes in an outer cooling jacket similar in construction to a tubular condenser. The gas and gel are separated at the top of each adsorber by a cyclone separator. The gel is fed into the gas stream at the bottom of the adsorber by a small screw conveyor. In actual practice three such adsorbers are used in series, the gas and gel flowing counter-current through the series. In this way most effective stripping of the gas and saturation of the gel are secured. After traversing the final adsorber (the one nearest to the gas inlet), the saturated gel is taken from the cyclone separator by screw conveyor to the top of the "primary activator." This is in effect a still in which the adsorbed vapours are driven off. It consists of a series of horizontal hearths placed vertically above one another and heated by flue gases from a gas furnace. The hot gases pass through flues interspaced with the hearths, but do not come in direct contact with the gel or distilled vapours. The gel entering at the top hearth is raked slowly downwards from hearth to hearth by means of revolving rakes keyed to a vertical central shaft. The arrangement is very similar to the usual pyrites burner. The gel, completely freed from volatile vapours, is discharged from the bottom hearth into another screw conveyor, which carries it to a "secondary activator." This activator consists of a slightly inclined revolving drum heated by means of an external jacket through which hot flue gases pass. The purpose of this second activator, into which a small volume of air is drawn, is to burn-off any non-volatile deposits from the gel. The temperature in the primary activator is maintained at 300° to 500° C. and in the secondary activator at 550° to 600° C. The gel leaving the secondary activator is completely revivified, and is returned by means of an air blast, provided by a fan working in a closed cycle, to the gel storage and cooling hopper, from which it again enters the adsorption cycle. The coke-oven gas which passes through the adsorption units in the opposite direction to the gel is finally discharged from the last cyclone (the first from the point of view of gel flow) and passes through bag filters which remove any gel remaining in suspension and return it to the system.

The adsorption plant erected at the time of Prof. Williams' visit was an experimental one, designed to handle 80 to 100 c.ft. of gas per minute. This gas was drawn from the mains of the Bethlehem Steel Corporation's coke-ovens at Baltimore at a point immediately following the ammonia scrubbers. The coke-oven plant was of the Koppers type and the gas had passed through the usual tar extractors, ammonia saturators, and water-spray coolers. It may therefore be taken as a fair average coke-oven gas. The results of a typical test are:

I.—Benzole in inlet gas (control):
Total volume passed . . . . . = 54·54 c.ft. at 90° Fahr.
Total benzole recovered on distillation = 51·5 c.c.
Benzole content (at 90° Fahr.) . . . = $\frac{51·5 \times 0·2200}{5·463}$ imp. gallons per 10,000 c.ft.
= 2·073 imp. gallons per 10,000 c.ft.

II.—Benzole in effluent gas from plant (control):
Volume gas passed . . . . . = 186·68 c.ft. at 90° Fahr.
Benzole recovered . . . . . = 7·5 c.c.
Benzole content (at 90° Fahr.) . . . = $\frac{7·5 \times 0·2200}{18·668}$ imp. gallons per 10,000 c.ft.
= 0·0884 gallons per 10,000 c.ft.

III.—Efficiency of adsorption in plant (calculated from control tests).
$= \frac{(2·073 - 0·0884) \times 100}{2·073} = \frac{198·46}{2·073} = 95·7$ p.ct.

IV.—Recovery of crude benzole in plant (over the same period as that of the above tests):
Gas treated . . . . . = 103·505 c.ft. (at 90° Fahr.)
Recovered crude benzole . . . . = 10·55 imp. gallons.
Benzole . . . . . = 1·898 imp. gallons per 10,000 c.ft.
Theoretical recoverable . . . . . = 1·9856 gallons per 10,000 c.ft.
Efficiency of recovery . . . . . = 95·6 p.ct.

This figure of 95·6 p.ct. is the average of three shifts' continuous working. Actually one of the shifts operated at 97 p.ct. efficiency. A detailed examination of the product was not made, as the quantity available was too small; but the results entirely bear out the conclusions arrived at in the laboratory as to the excellent recovery of hydrocarbons attainable. The recovered product was, however, not so satisfactory. A colourless non-gumming distillate had been expected from the gel, but the product actually obtained was yellow or yellowish brown, and neither modifications in the method of working nor redistillation of the crude spirit gave appreciable improvement. It was evident that the crude spirit would need further refining. The refining of a liquid spirit with gel had already been worked out in detail by the Silica Gel Corporation in connection with the refining of petroleum oils, and a continuous agitation and filtration plant capable of dealing with 3000 gallons per day had been designed to operate this process. The case of benzole, however, proved to be somewhat different. Agitation with silica gel, followed by filtration, did not produce marked improvement in the appearance of the product; but there was this actual improvement in fact, that, if the so treated liquid were distilled, 88 to 89 p.ct. came over below 130° C. as a colourless product, while the residual high-boiling 10 p.ct. was only very slightly coloured. The higher boiling fraction could also be rendered colourless by a further treatment with gel, and redistillation.

The plant designed by the American Corporation for carrying out the liquid phase refining treatment described consists in its simplest form of a tank fitted with an agitator for mixing the liquid and gel. The mixture from this tank runs to an "Oliver" continuous vacuum filter, from which the treated liquid is withdrawn, while the gel is carried by screw conveyor to a primary and secondary activator of the type already described. In practice, in order to obtain the maximum duty from the gel, three agitating vessels and three "Oliver" filters are placed in series, the gel and liquid passing counter-current through the system. The efficiency of the recovery, refining, and distillation operations, and the over-all efficiency of recovery based upon the amount of hydrocarbons initially present in the gas, are shown below. It will be seen that of 100 parts of hydrocarbons in the gas 87·8 are recovered, of which 80·8 are obtained as refined motor spirit and 7 parts as solvent.

| Stage. | P.Ct. Recovery during Stage. | P.Ct. Recovery of Initial Amount in Gas. |
|---|---|---|
| (1) Adsorption . . . . . | 97·0 | 97·0 |
| (2) Distillation of gel . . . . . | 95·6 | 92·7 |
| (3) Liquid phase refining . . . . . | 98·8 | 91·0 |
| (4) Fractionation— | | |
| (*a*) Motor benzole (80° to 130° C.) . | 88·8 | 80·8 |
| (*b*) Solvent (130° to 184° C.) . . | 7·7 | 7·0 |
| (*c*) Residue and losses . . . . | − 3·5 | .. |
| | | 87·8 |

The quality of the motor spirit recovered was excellent, and able to meet the requirements of the British Engineering Stan-

dards Specification No. 135, 1921, except in one important particular. The specification requires that a satisfactory motor spirit shall give only a pale yellow colouration when treated with concentrated sulphuric acid. This requirement is, in fact, a test that all unsaturated constituents of the benzole have been eliminated. Silica gel does not remove all the unsaturated constituents, but only those which are objectionable through a tendency to polymerize. This discrimination between valuable and objectionable unsaturated compounds is one of the chief merits of the process, and provided that the product obtained is able to prove its suitability for use in a motor engine, the fact that it is unable to pass the sulphuric acid test is of no consequence, and should be ignored.

The author adds that the ultimate test of the commercial value of the process lies in the cost of production. It is difficult to come to a satisfactory conclusion on this point until trials on a larger scale have been carried out, but all the calculations show that a very real reduction in cost of production is to be expected. The plant, though mechanically somewhat complicated in comparison with an oil-absorption or static-bed type adsorber, requires little supervision, and, once started, is practically automatic. The circulation of the solid gel, by means of conveyors and air blasts, works smoothly, and no sign was shown of any appreciable wear in the moving parts. No trouble was experienced during the trials made due to the presence of impurities such as tar fog, which, it had been anticipated, might coat the surface of the gel, and so inhibit adsorption. The adsorption of water vapour by silica gel, though undesirable from the standpoint of hydrocarbon recovery, does not prevent adsorption of hydrocarbons, though the degree of adsorption is limited to 9·10 p.ct., and in practice is calculated not to exceed 8 p.ct., of the weight of the gel.

### Discussion.

Mr. GORDON ADAM (Tar and Ammonia Works, Gas Light and Coke Company) said there was room for both these processes. Most benzole manufacturers would agree with him that benzole extraction and refining was not nearly so efficient as it might be. The silica gel method certainly offered a very big improvement over existing processes. The two processes described by the two authors might be regarded as the static and the dynamic processes; the charcoal process being the former. There was an advantage in favour of the silica gel process, in that it could be handled much more easily without losing its efficiency. Personally he believed the static process would be found to be the cheaper of the two in capital cost. In the case of the sulphur recovery plant mentioned by Major Gloag, it seemed to him that the blowing in of ammonia might make it expensive. He knew that the gas-works people usually slipped in a little ammonia to activate the oxide in the purifiers, but the amount was only 5 grains per 1000 c.ft. If it were a larger quantity than this, it would make the process expensive. The other application of activated carbon to gas-works practice appeared to be in the removal of naphthalene and carbon bisulphide. There already existed a system for the removal of the latter compound, which, however, was expensive; and it seemed that activated carbon would be a cheaper method. Apparently this process could be applied to the removal of naphthalene, and the silica gel to the removal of water vapour from the gas. Gas engineers had recently been much alarmed about the corrosion of pipes. It was found that after gas mains and pipes had been down a few years, serious corrosion took place; and it had been suggested that the removal of the water vapour from the gas would lessen this, and the silica gel process appeared to be a cheap means of doing so. After all, the whole question in regard to benzole recovery came down to the difference in cost of a gallon of benzole produced by the activated charcoal or silica gel process as compared with existing methods. Perhaps there might be some enlightenment on this point.

Dr. W. R. ORMANDY said that, while there was strong evidence in Major Gloag's paper that the process he referred to was a workable and commercial one, it must be borne in mind that a method which might be made economically possible in Germany, owing to internal conditions, such as the supply of the necessary raw materials being at hand, and so on, would not necessarily be so economical in this country or even in the rest of the world. Moreover, in Germany there was a fairly heavy duty on motor spirit going into the country, and this gave the home producers of benzole a great advantage. He hoped that at some future date it would be possible to have a paper dealing with the fundamental principles underlying the activated carbon process. The process mentioned for the removal of sulphur was of tremendous interest, and would be of very much greater interest in the future than it had been hitherto, because there was not the slightest doubt whatever that when the technique of high pressure catalytic reaction developed many catalytic reactions would be carried out under high-pressures using as raw materials carbon monoxide, carbon dioxide, hydrogen, water gas, producer gas, and similar bodies, in which the sulphur was the one vital difficulty. It was always the sulphur which acted as the destroyer of catalytic surfaces, and processes were required for reducing this compound to the minutest quantity at a very low cost. He would like to know the composition of the benzole recovered by the activated carbon process. Did it contain elementary sulphur? It was the elementary sulphur which caused the trouble. Activated carbon was undoubtedly selective in its action, unlike silica gel. With regard to the latter process, the question had been asked as to a possible explanation of why the adsorption took place. He held the view that the evidence in favour of a purely mechanical explanation was not good enough. He would also like to ask with regard to silica gel the same question that he had asked with regard to activated carbon—was there any elementary, as distinct from combined, sulphur, which he did not regard as of very great importance? He did not think Prof. Williams' statement with regard to the gumminess of the benzole he obtained would hold unless he was referring to benzole which had been purified or prepared by some method. He could conceive that there would be benzoles, yellow in colour, which would not exhibit these gumming properties; and it would be interesting if the author could indicate some means whereby these properties could readily be measured. It was important that we should use home-made fuels if possible, and not use petrol which boiled at over 200°. It seemed absurd that we should stop distillation of our home-made benzole at 130° and sell solvent naphtha at a very much lower price, if such solvent naphtha could be used in admixture as a motor fuel. This point was important because it was the higher boiling point fractions which had a tendency to produce gumminess in an engine. It was extraordinary that the same material produced in the laboratory should be water white, and when produced on the large scale should be yellow, and said to set up gumminess because of its colour. He did not agree that that would be the case, and wished they had been told why by the author.

Major GLOAG, replying to Mr. Gordon Adam's remarks, said the amount of ammonia fed in was 0·5 gramme per cub. metre, and this gave perfect deposition of the sulphur in the pores of the carbon. He agreed that owners of existing oil-washing plants could not be expected to scrap them at once, especially if they were working at reasonable efficiency. In reply to Dr. Ormandy, he hoped it would be possible to give what he suggested in the form of a scientific paper on the principles, at a later date. As to elementary sulphur being present in the benzole, it was present in gas-works practice, but with the activated carbon purifier its presence had yet to be proved.

Prof. WILLIAMS said that when he first started the work for the National Benzole Association he had had a great deal of help from Mr. Adam. He then found that silica gel was by no means new to Mr. Adam, and it was entirely due to his strong support that the work had been rendered possible. As to drying coal gas, silica gel would do this, and it had been put on to drying blast-furnace gas in order to get a higher temperature in metallurgical operations. With regard to the cost of benzole prepared by the silica gel process, it was difficult to make a comparison, because at the present time he did not think benzole makers had any real standard basis of stating their costs. One maker might say his costs were 6d. a gallon, and another maker would say 1s. per gallon, and neither of them would include the same items. As a guide, however, a figure of 2·3d. per gallon with the silica gel process had been estimated, and had been agreed by a coke-oven director. Anyway, that was a figure to keep in mind when endeavouring to make a comparison. As to the elementary sulphur, mentioned by Dr. Ormandy, that matter was being gone into by the National Benzole Association.

Dr. ORMANDY: A method has been worked out and published for estimating the elementary sulphur.

Prof. WILLIAMS, referring to the remarks by Dr. Ormandy upon gumminess, said that in the copper dish test there was a black shiny varnish on the inside of the dish in the case of gummy fuels. He believed the colour of the benzole which gave gumminess was due to the polymerization of the very highly unsaturated hydrocarbons. Probably the reason why this did not take place in the laboratory tests, and a water-white benzole was obtained, was that insufficient time was allowed for the polymerization to take place.

Mr. F. M. POTTER thought it was wrong to regard the silica gel process and the activated carbon process as in any way in competition. There were certain cases in which the silica gel system had the advantage, and in others the activated carbon method might be more suitable. In the case of water removal, for instance, silica gel seemed to him to be pre-eminently suitable. On the other hand, in the case of the recovery of volatile solvents from air-solvent mixtures, activated carbon undoubtedly had a very high efficiency when applied to low-concentration mixtures. To compare the two processes, therefore, it was necessary not only to consider the question of cost, but the particular purpose for which they were used. It had been generally thought that the cost of silica gel would be cheaper than activated carbon, because the gel was made from a relatively cheap raw material—water glass. Whether this would be found to be the case when the whole process was worked out, he did not know. The question was at what price the user could obtain these solid adsorbents, and what royalty he had to pay on the process. In the case of the recovery of volatile solvents from air-solvent mixtures, he had some figures with regard to an alcohol-air mixture containing something of the order of 30 grains per cub. metre. The total steam used for the recovery of 98 p.ct. of the alcohol was 7½ kg. per kg. of alcohol recovered. This was on a plant working with H charcoal, which was said to be not so efficient as the T charcoal. On some tests he had made on a sample of benzole from the Bernau plant he had found that it did not give any darkening with the mercury test, nor did it give any reaction with the copper dishes. It gave a very slight trace of gum, of the order of 3 or 4 milligrammes, but it was within the limits set by the American specification for that test. It showed no sign whatever of free sulphur. It contained carbon bisulphide, but the figures in this respect from any one batch were not reliable. The carbon bisulphide recovery figures from benzole depended entirely on the conditions under which the filters were operated. It was possible to work the charcoal filters under the same conditions as the gel, in which the carbon bisulphide was passed forward and not recovered. He had been told that at Bernau the carbon bisulphide was of the order of 0·4 p.ct., and that this charcoal-recovered benzole was marketed higher than ordinary petrol, 38 gold pfennige against 32. Why that should be so, he did not know, unless the carbon bisulphide was considered an advantage. It was admitted that it had no disadvantage in the matter of corrosion of the engine, and possibly it was found to have an extra kick when starting up. Anyway, so far as the charcoal process applied to town gas was concerned, it did seem to give a substantial advantage. On the other hand, the people over there did not seem to be quite certain whether they should remove the sulphur. From experiments which he himself had made he found it was practically certain that the sulphur would have to be removed, and that in the case of coke-oven gas, if there was $H_2S$ in it, then there would be free sulphur in the benzole. He was going to ask Prof. Williams whether any of the darkening in the silica gel process was due to free sulphur; but he had already stated that there was that possibility. It was curious that there was a tendency to get this dark colour in commercial manufacture and not in the laboratory. Charcoal-recovered benzole was reasonably free from colour. As to gums, he personally doubted whether they came from the gas, and he

felt that in this country they were inclined to get a wrong impression. He believed that the gums arose in part from the decomposition of the wash oil, possibly from the phenol content. The charcoal-recovered benzole seemed to contain no appreciable gum.

Dr. R. LESSING referred to the method which he worked out some time ago and described at a meeting of the London Section of the Society of Chemical Industry. That was in 1917, and he thought the process had some bearing on the present problem. If there was any credit to claim to be the first in the field with a static method, he believed he could make that claim. When he developed the process, it was at a time when benzole, and particularly toluole, was required very badly; and endeavours were made to get not only the large gas-works and coke-ovens into line, but also the small gas-works, for this purpose. He therefore devised a process very much on the lines of the ordinary gas-works purifier—*i.e.*, a static system, in which he used kieselguhr soaked in creosote or anthracene oil or the ordinary wash oil of coke-ovens. The process, when one considered the simple means adopted, was very successful. He had obtained two gallons of benzole per ton of coal, this benzole being actually of a higher quality than that obtained from the ordinary washing plants. The volume of adsorbent required with such an impregnated brick process was not so very much larger than that required for charcoal or silica gel. It was 3 to 3½ times the amount—*i.e.*, 1 million c.ft. of gas would require adsorbers about three times as big as these others. On the other hand, the great advantage would be that it was possible simply to steam the material out, and it could be used again immediately. In that case, also, the oil adsorbed a considerable proportion of the carbon bisulphide; and from the gas maker's point of view he disagreed with Prof. Williams in saying that it should be an advantage not to take the carbon bisulphide out. The benzole or tar would have to go through a fractionating process; and in that case it would be very much simpler to take the carbon bisulphide out. He knew that the charcoal process could be used with a slight covering of oil, and he wondered whether in the case of the silica gel there would be any advantage from the addition of oil. If the mechanical theory held, it should be possible.

Mr. P. PARRISH thought the object of the meeting had been a little misinterpreted. It was not the intention to hold up either silica gel or activated carbon as superior to the other. Those who had listened to the papers and discussion must have come to the conclusion that there were certain problems most suitable for activated carbon, and others for silica gel. For instance, silica gel had a very good function to perform in the removal of naphthalene from coal gas; and if, as had been adumbrated, a small plant involving about 30 lbs. of silica gel could deal with 2 million c.ft. of gas, there was an enormous field for it. In the case of the silica gel process, was debenzolized gas used as the medium by which the silica gel was blown through the tubes, and could Prof. Williams give any idea of the extent of gas required to perform this particular function? Major Gloag had referred to the removal of hydrogen sulphide by means of activated carbon; but he personally was not enamoured of the economic success of that process. Apparently the Bayer Company were proposing to use a method which had failed from the economic point of view in France.

Mr. SUTCLIFFE (Messrs. Evans and Sutcliffe, Newton-le-Willows), speaking as a manufacturer of carbon in this country, mentioned the varying results obtained in the manufacture of carbon even when working with the same material. What caused that could not at present be discovered. As far as his own researches and also those carried out elsewhere were concerned, it was a subject about which very little was known. He believed that silica gel could do certain things that carbon could not do. On the other hand there were things which charcoal could do which silica gel could not.

Major GLOAG, replying to Dr. Lessing, said that at Dessau they had coated the whole of the charcoal with oil, but they got no adsorption. That was a lubricating oil, which he agreed was not a good adsorbent, but if they had coated the charcoal with cresol, the result would have been the same. As to clearing the naphthalene filter, at Leverkusen the filters had to be taken out every eight weeks, and there were losses of charcoal in consequence. Now the filters were to be washed out with benzole, and the benzole recovered. As to the efficiency of recovery in the case of town gas, it was complete.

Prof. WILLIAMS said he did not think he was giving away any secret in replying to Mr. Potter as to the price of silica gel, when he said that the royalty, which included everything, was 1·37d., or something like that, per gallon of refined spirit. He should think that to coat the silica gel with oil, as suggested by Dr. Lessing, would make the process an expensive one. Indeed, he agreed with Major Gloag that it would result in a loss of adsorptive power. In reply to Mr. Parrish, he said that the last thing he wished to do was to put the charcoal and the silica gel processes in competition.

A hearty vote of thanks was accorded the authors at the conclusion of the discussion.

## THE INSTITUTION OF CIVIL ENGINEERS.

### Heat Engine and Boiler Trials Committee.

In 1902, the Institution of Civil Engineers published a code with the object of systematizing tests of boilers and steam-engines, and in 1913 this code was revised.

Recently the Institution of Civil Engineers invited seven other Institutions to co-operate in the revision of the 1913 code and in the establishment of a code for internal combustion engines, and for this purpose a Committee was formed to which the eight Institutions have nominated four members each, while in addition there are representatives of the British Electrical and Allied Manufacturers' Association and of the British Engineers' Association. The eight Institutions are:

Institution of Civil Engineers,
Institution of Mechanical Engineers,
Institution of Electrical Engineers,
Institution of Naval Architects,
Institution of Marine Engineers,
North-East Coast Institution of Engineers and Shipbuilders,
Institution of Engineers and Shipbuilders in Scotland,
Institute of Chemistry of Great Britain and Ireland.

The membership of the Committee has been carefully chosen, so as to include experts in the various departments of the inquiry as well as the users and makers of all the various kinds of heat engines.

The main Committee is divided into sub-committees and panels, which are empowered to co-opt members to obtain advice on any special point, and the distribution of the work between them will give some idea of the scope of the undertaking.

Sub-Committee I.: Boilers and Steam-Engines, the details being entrusted to:

Panel A: Revision of the 1913 Boiler and Engine Code.
Panel B: Steam-Turbines for Land Purposes.
Panel C: Steam-Turbines for Marine Purposes.

Sub-Committee II.: Internal Combustion Engines, the details being entrusted to:

Panel D: Gas Engines and Gas Producers.
Panel E: Petrol and Paraffin Oil Engines.
Panel F: Heavy Oil Engines.

Sub-Committee III.: Calorific Value of Fuels.

Sub-Committee IV.: Methods of Measurement and the use of Instruments.

Sub-Committee V.: Definitions and Values as applicable to units of Measurement, &c.

In the revision of the 1913 code, the question of separating the furnace efficiency from the heating surface efficiency of boilers is being considered. The methods of making measurements will also be added to, so as to include instruments and apparatus now available.

The tabulated forms required for a "comprehensive" test of the respective types of heat engines are now nearly completed. Selected items have been abstracted to produce short forms suitable for "commercial" tests. It is proposed to print separate forms both for "comprehensive" and "commercial" trials for boilers, gas-producers, and all the various heat engines.

The next stage in the work will be the preparation of an appendix giving suitable methods for making the various measurements, and of another appendix setting out the calculations required to arrive at the conclusions derived from the data obtained by observation. Separate appendixes will be prepared for "comprehensive" and for "commercial" trials.

In due course it is proposed to submit various items for discussion to the particular institution or institutions most interested in the items in question. In this way it is hoped that the final findings of the Committee will embody the views of all those interested in the testing of heat engines. For example, the standard of comparison for steam-engines was determined by a Committee of the Institution of Civil Engineers in 1905; and it has been generally adopted. Similar standards for internal combustion engines are not yet generally recognized. Such standards are in preparation by Sub-Committee II., and when determined will be made the subject of a discussion before the interested institutions.

A very important feature is the fact that the Committee is in close touch with the corresponding Committee of the American Society of Mechanical Engineers. The Secretarial work is undertaken by the Institution of Civil Engineers.

## York Gas Centenary Celebrations and "B.C.G.A." Conference.

Next week will be a great time for the gas industry in York, for the York Gas Company will be celebrating their centenary, the British Commercial Gas Association will be holding a district conference in the city, and there will be the official opening of a new vertical retort installation at the gas-works—a programme of which "Progress" will be the keynote. On Wednesday, March 26, after luncheon, the vertical retorts will be inaugurated, and in the evening the Chairman and Directors of the Gas Company will hold a centenary reception in the Assembly Rooms, with a lantern lecture by Dr. Saleeby. The following day, in addition to the "B.C.G.A." conference in the York Museum (opening at 11 o'clock), there will be a centenary luncheon in the Guildhall. The President of the Conference is to be Mr. A. Procter (Chairman of the York Gas Company), and a discussion on "The Gas Industry as a Public Service" will be opened by Mr. F. W. Goodenough ("B.C.G A." Executive Chairman) and Mr. H. E. Bloor, B.Sc., B.Eng. (Engineer, Secretary, and Manager of the York Gas Company). The afternoon will be devoted to a visit to Rowntree Village Trust Estate (to inspect all-gas houses) and a paper by Mr. W. J. Swain, M.I.Struct.E. This is not all, for in connection with the centenary celebrations there is being arranged in the Gas Company's showrooms an Historical Exhibition demonstrating the development of lighting devices throughout the ages, and more particularly the progress of invention in gas appliances. In this exhibition we believe that Mr. Bloor has got together something unique in its completeness, and all visitors connected with the gas industry will be heartily welcomed to it. The Directors of the Company are also offering prizes for the best essays by boys on "Gas Manufacture and Distribution," and by girls on "The Uses of Gas." These prizes have been eagerly competed for.

## MIDLAND JUNIOR GAS ASSOCIATION.

A Meeting of the Association was held at the Council House, Birmingham, on March 6—Mr. L. H. THOMAS (President) in the chair.

Mr. A. WHITEHEAD (Birmingham) read the following paper on

### GAS-FIRES IN HOTELS AND BOARDING-HOUSES.

It is considered to-day to be a very attractive form of advertisement by all proprietors of hotels and boarding-houses to add to their Press announcements that all bedrooms are fitted with gas-fires. The up-to-date manager realizes that to have the latest labour-saving devices fixed is a great asset to the success of his establishment; and only those who are intimately connected with the management of hotels and boarding-houses appreciate the amount of hard, monotonous, and unnecessary labour entailed under the old system of heating rooms by coal-fires. Further, nothing is so discouraging to visitors as to see such establishments in possession of an open coal grate, with its attendant dirt and inconvenience. The presence of a coal-fire to-day in these establishments is a constant source of contention between the management and visitors, inasmuch as, if a fire is necessary—and in our climate there are very few weeks when this is not so—arrangements have to be made beforehand by the guest for a fire to be laid, and, if not actually lighted, to be in readiness should the weather warrant it. Then, to receive one's bill, *plus* so much for fires, is a most unsatisfactory procedure. Again, residents returning from the theatre should have ready for their convenience the same facilities for warmth as they have for lighting—namely, instant service. It is here that our commodity is given an opportunity to demonstrate its virtue.

A few weeks ago, during a visit to an important hotel in connection with the installation of gas-fires, I had an opportunity to see at first hand the very many difficulties with the coal grate. The hotel consists of between 300 and 400 bedrooms, mostly fitted with coal grates. During the severe weather the majority of the rooms were using coal fires, which meant that the members of the staff whose duties included the preparing, lighting, and attendance of these fires had to rise much earlier each morning. Many hundredweights of coal had to be carried from the basement to the various floors and rooms—an operation which usually meant that one of the electric lifts had to be in constant use during the early hours. The unhealthy process of clearing away the previous evening's ashes—to say little of the damage to bed linen, curtains, and furniture by dust, grit, and smoke, and the inconvenience to the resident—had to be carried out. I am pleased to say that the management of this hotel have decided to discontinue in many rooms the use of coal; and at the present time we are engaged in fixing gas-fires in fifty or sixty bedrooms, while provision is being left for extension to other bedrooms.

#### ADVERTISEMENT VALUE TO THE INDUSTRY.

Modern establishments fitted with gas-fires have wide possibilities of advertising value to our industry, for, with an ever-changing list of guests, more publicity is given than appears on the surface. To make the publicity of real and lasting value, however, gas salesmen should realize that where fires are installed they should be of proper design to harmonize with the surroundings, and neatly fitted, with no gas-supply pipe across the tiled hearth. Neatness should be aimed at in all installations.

In one or two instances recently we have had the old-fashioned coal grate with dogs submitted to us for conversion to a gas-fire; and while I do not favour their conversion, nevertheless the proprietors sometimes have a more than sentimental value attached to the old grates on their premises. In several instances with which we have had to deal recently, we have brought the coal grates to our shops and fitted into them gas-fires of the "Sunbeam" or "Cinderella" type. They look most effective when finished. I mention this because it will probably be of some advantage to members to know that it can easily be done. The advantages of the gas-fire have prompted meter manufacturers to place upon the market various types of small meters; they fulfil the requirements, and are neat and compact. The connections are so fitted that they may be fixed near the fireplace, and remain inconspicuous; they may also be fixed in small wooden cupboards of a design blending with the furniture in the room.

In hotels where the resident may only be in occupation a few days, the meter fitted with prepayment mechanism is the type to be recommended. The meter serves the dual purpose of enabling the resident to pay for his gas supply in advance and also to get satisfaction, because he knows that no further calls for extras will be made on his bill. The hotel manager, while giving his guest up-to-date service, convenience, and comfort, sets the meter at a figure which sufficiently recompenses him for his initial outlay. Only those meters which are fitted with proper means of registration should be installed.

#### MAINTENANCE.

The question of the maintenance of gas-fires in these establishments is one that calls for serious consideration. There are two methods by which this can be done advantageously both to the gas undertaking and the management of the establishment. The undertaking may contract to supply the necessary labour at a nominal charge *plus* a cost for any renewals such as fuel radiants, &c.; the other system—the one which I think is most advantageous and would pay the local undertaking—is to supply the labour free of charge, the hotel management paying for the cost of any renewals which may be necessary from time to time. The latter gives the gas undertaking the advantage of easier access to the premises.

#### SUPPLIES.

We all realize that the supplies laid to gas-fires should be of adequate size, and under no consideration should pipes of less than ½-in. diameter internal bore be laid to hearths. In this type of establishment, where varied temperatures are very much in evidence, ample provision should be made for syphons, and these again should be placed in a most advantageous position, and out of sight. It is most desirable that no supply pipes should be seen, and the controls for the fires themselves should be of the loose key type, which can be used in conjunction with either the simplex or duplex taps on the fires. Further, great care should be taken with the flue, to be sure that the maximum amount of efficiency is being given from the fire; a little extra time spent on the flue itself often amply repays. As members of the gas industry, we must realize not only that a properly fitted gas-fire installed in such places can be a great asset as regards advertisement, but that, if improperly fitted, the reverse is the case.

I suggest that a concentrated campaign for the installation of gas-heating in all hotels and boarding-houses would more than repay gas undertakings. Often the question of installation costs militates against the management accepting quotations for the work. No doubt it would be advantageous to consider the wisdom of offering special terms for installing the necessary supplies; but whatever the results may be, we must keep definitely before the salesman that he has the ideal fuel and the ever-ready servant.

At the conclusion of his paper, Mr. Whitehead gave some interesting particulars of an installation recently carried out by the Gas Department in a large hotel in Birmingham. He explained that difficulty was experienced in accommodating the 400-light wet meter (cylindrical type) which was necessary for the gas-fire supplies, but this was overcome by fixing the meter in the position occupied by an old 200-light. As the space was so limited, the latter meter was raised and fixed over the 400-light, being held in position by rolled-steel joists, which made a neat and compact job. The old 3-in. cast service which had been in the building about 25 or 30 years was replaced by a 6-in. pipe; and as the gas supply to the hotel had to be maintained during these alterations, a temporary rider was connected during the Saturday night and Sunday morning. The final connecting-up of the meters took place during another week-end at similar times.

The installation consisted of approximately 1900 ft. of wrought-iron gas supply, of which 300 ft. of 4-in. and 400 ft. of 3-in. pipe were used. As the supplies had to be taken from the basement, rising up to the gas-fires on the fifth floor, and passing through varying temperatures, careful selection was made, and ample provision provided for syphons at the bottom of the two main uprights. The syphons were left 2 ft. from the floor level, and fitted with a control tap to prevent possibility of smell rising from any spilled condensation during the process of emptying. The whole of the supplies were tested each day during the course of the work to a pressure of 12 in. water column; this pressure being obtained by means of a force pump, which forced the air very slowly into the installation in each of the rooms.

Care was taken to conceal the supply pipes, passing them under the tiled hearths to the fenders. The cocks were of the loose-key type, fitted in the floor near the tiled hearth, provision being left under the hearth so that, should it be necessary at any time to renew or clear this section of the supply pipe, it could be easily withdrawn from under the tiles and trimmer. Further, throughout the whole installation all the supply pipes were fitted and fastened by means of gas hooks and wrought-iron clips, and in no instance were any of the hooks or clips fitted with wooden plugs in the brickwork. Ample provision was made for the clearing of the supplies at any future date. Upon completion of the job two sets of plans of the building were made, and on these was marked the whole of the gas-fire installation, showing the size of the pipes, positions of syphons, clearing plugs, running joints, and the controls on the various floors. One set of these plans was given to the Resident Engineer, who will be able to ascertain at any future time information which will assist him.

It is gratifying to know that the Gas Department received a letter from the head of the department controlling this hotel (which is one of many under their control), stating that the installation was one of the best he had ever inspected.

### Discussion.

The PRESIDENT said Mr. Whitehead was to be congratulated upon the complete way in which he had treated the subject, which was of special interest to those on the distribution side of the industry, and to those directly concerned in salesmanship.

Mr. H. CLARKE (Derby) moved a vote of thanks to Mr. Whitehead. Only that day he had been in negotiation for an order to instal 42 gas-fires. The first difficulty he had to meet was to dispel the erroneous idea that the electrical industry was gradually ousting gas. He was glad to say that he successfully demonstrated the fact that gas was three times cheaper than electric current.

Mr. S. W. SIMMONS (Dudley) seconded the vote.

Mr. W. B. COBB (Birmingham) said the author had made a point about the desirability of putting the pipes out of sight, but it seemed to him that this idea could be carried too far. The pipes which were essential could be neatly fixed, and when examination was necessary

the inconvenience occasioned was negligible. It would be serious if a leakage developed under a tiled hearth.

Mr. L. STURDY (Birmingham) agreed as to the desirability of concealing as many of the pipes used as possible. He would like to see the time when maintenance work was done free by gas undertakings, for it would be to their advantage. As to the selling price of gas in hotel installations, a warning should be given lest the charges became extravagant. A sixpenny meter was preferable to a shilling one. If persons were overcharged while staying in hotels, the effect created might easily operate against gas consumption, should any question arise later in their private residences.

Mr. W. E. CADWALLADER said it was very important that the supply pipe for a gas-fire should be of adequate size. In boarding-houses there were sometimes pipes of insufficient size. The result was a bad advertisement for gas. It should be possible adequately to heat a room in one hour. Then, by means of a duplex tap, the heat could be reduced to one-half. He was in favour of running the supply pipes out of sight, and particularly those near the hearth. One great disadvantage of exposed pipes was that arising from additional cleaning. A good deal was to be said in favour of compo. meter connections. As to maintenance, a nominal charge would afford the best solution of the problem.

The PRESIDENT remarked that it was significant that in Birmingham and most big cities gas consumption during the past few years had substantially increased. This was due in part to increased industrial requirements, but most of the extra output was the result of the increased use of the gas-fire. It seemed to him that one of two things was necessary: Some scheme of maintenance providing for frequent examination of gas-fire equipment; or the better instruction of the public as to the correct adjustment of the bunsen burner, and the way to clean gas-fires.

Mr. WHITEHEAD replied at length to questions of detail relating to the hotel installation. As to the cost of gas and electricity, there was no question that the former was much cheaper. Whatever claims were made for electricity, the fundamental question of cost could not be overcome. The advantages of the iron pipe were much greater than those of compo. pipe. He was in favour of a free scheme of maintenance. Efficiency of maintenance meant a satisfied customer, and efficiency was achieved better under a free system. Nearly half the complaints of customers were due to their lack of knowledge as to the adjustment of the bunsen burner. It was invariably better to hide the pipes.

## SCOTTISH JUNIOR GAS ASSOCIATION.

### (WESTERN DISTRICT.)

A largely attended meeting of the Western District of the Scottish Junior Gas Association was held in the Royal Technical College, Glasgow, last Saturday week—Mr. ANDREW WALKER, of Kilbarchan (the President), in the chair.

The chief business before the meeting was a paper by Mr. ROBERT GRAY, of Hamilton, from which the following extracts are taken.

### MODERN METHODS OF COAL CARBONIZATION.

#### THE HORIZONTAL RETORT.

Despite the fact that it may be classed as primitive, the horizontal retort still maintains its place as a modern means of coal carbonization. Numerous attempts have been made to displace this type of retort by that which would at first sight appears to be more economic and efficient; but, in spite of all modern inventions, it has proved capable of further development, and has risen to the occasion. It is well known that the largest gas undertakings in the world still continue to carbonize coal in horizontal retorts. This is surely fine testimony as to their efficiency. In several instances where it was found necessary for the carbonizing plant to be completely rebuilt, and where one would have thought more fashionable methods would be installed, the horizontal retort still continues to perform the most important process of gas-works practice. It seems that its day is not passing, but that it will continue to maintain its position among modern coal-carbonizing plant. It would appear that science could not enter into the working of horizontal retorts, and that the old rule-of-thumb methods must continue; but this is far from true, for science can be applied in a degree equal to that of more modern plants.

The construction of the horizontal-retort setting has been modified to meet present-day requirements. The producer and regenerative system in most instances have undergone considerable alteration as regards design and dimensions, with the view of increasing efficiencies. The combustion chamber and retorts are now usually composed of silica material, allowing a high working temperature. The retorts themselves are now usually built-up in segments of a material with high silica content. In the case of the segmental retort cracking, instead of developing throughout a considerable length of the retort, the crack is confined to one particular segment. The life of the retort is greatly increased. Wear and tear usually being confined to certain parts, the segments affected can be replaced, so that the maintenance cost is less than that of the ordinary moulded fireclay retort. Apart from cost, the segmental retort possesses many advantages over the older type. Methods of control have greatly improved within recent years.

In comparison with other types, the horizontal retort does not make such rigid demands as regards the quality of coal. It seems to be capable of dealing with inferior material, and producing better results from it than do other types of plant. This is no doubt due to the particular process of carbonization which the coal undergoes in the horizontal retort. It is well known that the atmosphere within a horizontal retort is different from that within (say) a vertical one. After the charge of coal has been placed in the former it is not distributed, but is allowed to remain in the same position throughout the whole carbonizing period. This, I believe, has a great influence upon the resultant products. Take the resultant solid product as produced in horizontal retorts; it is usually found to be one complete mass only broken in the process of discharge. This fine quality of coke is no doubt due to the fact that the charge has been allowed to remain undisturbed, and the coking property of the coal has been able to complete its function fully. In a continuous vertical retort the travel of the coal seems sufficient to destroy the coking property, and so makes it impossible for the bituminous element to function properly, resulting in a smaller residual coke than that produced in horizontal retorts.

Regarding the influence of the atmosphere within a horizontal retort upon volatile products, in many respects it may be said to differ very widely from that within the vertical retort. It is supposed that in the vertical retort each particle of coal is subjected to the same heat treatment. This cannot be said of the horizontal retort. The coal substance in contact with and near the heated retort surface must undergo an entirely different process of decomposition from that of the centre of the coal mass. The former must be subject to a rapid process of distillation, whereas the latter must undergo slower decomposition. With the introduction of science into methods of gas manufacture, the aim has been to decompose the primary into secondary products. This decomposition results in more heat energy of the coal substance being obtained in the form of a permanent gas, and at the same time produces a gas more suited to modern requirements. The conditions and atmosphere within the horizontal retort are admirably suited to this purpose. The free space in a horizontal retort is considerable, and the heated surface to which the travelling gases are exposed is perhaps greater than in any other type, so that the decomposition of the primary products can be accomplished very completely. So completely may this decomposition take place within the retort, that it may be carried to extremes, resulting in valuable products being broken up into their elements, which cannot be afterwards recovered in the form desired.

Ammonia in the form of ammonium sulphate contributes greatly to the revenue of a gas undertaking; and the production of it should be as high as possible. The ammonia formed within the retort should be preserved, and not be subjected to conditions which cause decomposition. The conditions prevailing within a horizontal retort are not such as tend to preserve the union of nitrogen and hydrogen in the form of ammonia. The decomposition of ammonia into its elements takes place in the region of 800° C. Knowing this, it would seem impossible for ammonia to exist when the free space within the retort approaches a temperature of 900° to 1000° C. Evidence that the ammonia does undergo decomposition is furnished by the amount of hydrocyanic acid and other cyanogen compounds present in the resultant gas and ammoniacal liquor. The amount of cyanogen compounds resulting from coal carbonization in horizontal retorts is much higher than that from any other method, proving that the decomposition of ammonia must be greater. This decomposition is by no means a desirable feature in any coal-carbonizing plant; and it is necessary to eliminate as far as possible any influence tending to produce this result. The highly-heated free space is certainly the most influential factor in the decomposition of ammonia; but to eliminate this means taking away a condition the presence of which plays a most important part in horizontal-retort practice. By lowering the retort temperature, and consequently the temperature of the free space, in order to preserve the ammonia vapour, the degree to which the hydrocarbons are decomposed must be less. It therefore becomes a matter of finding a medium whereby the preservation of ammonia vapour and decomposition of hydrocarbons may be best carried out.

The atmosphere within the horizontal retort also exercises a great influence upon the tar. The tar produced by this method of carbonization is found to be denser than that produced by other carbonizing plants. The constituents are also found to differ in character and quantity. The free carbon content is usually very high, due largely to the decomposition of hydrocarbon compounds within the retort. This decomposition, to some extent, may be claimed as an advantage, as it renders the distilled tar suitable for road-making purposes. The tar may be distilled to suit the requirements of surface-spraying, tar-macadam making, or for grouting purposes. The tar produced from horizontal retorts has certainly a wider range of uses to which it may be suitably applied than that of vertical retorts. The tar resulting from carbonization in vertical retorts is of much lower specific gravity, and the free carbon content is very low. It is very suitable for surface spraying, but not so good for tar-macadam making and heavy tar grouting. The difference in the composition of the two tars can easily be accounted for by the different conditions existing within the two types of retort during the period of carbonization. The gas produced by horizontal retorts is of high calorific value, usually much higher than that of vertical-retort gas. This has made it possible for undertakings with the latter type of plant to declare a medium or high calorific value.

#### THE VERTICAL RETORT.

The modern vertical retort will, I believe, be considered by the majority to answer most fully present-day requirements. During

the war, it seemed as if the circumstances were best met by carbonization in vertical retorts. This type was therefore adopted without hesitation whenever the question of renewal was raised. Does the same almost universal opinion still exist? Is there still no hesitation about their adoption?

In the vertical retort, the various products released from the coal substance during the process of distillation are preserved from decomposition, and recovered in their original form, more truly than in any other type of plant. From a physical and chemical point of view, the conditions existing within the vertical retort all tend towards the minimum degradation and decomposition. The coal is not subjected to harsh treatment and sudden change of conditions, but to a scientific process, with gradual change of retort atmosphere, which has the advantage of preventing the formation of undesirable products. It has its disadvantages also, as there are valuable constituents formed only by what may be termed "harsh treatment," the formation of which does not take place in the vertical retort to any great extent. Owing to the absence of much free space, the volatile products, in their travel to the off-take pipe, do not come under any severe influence of heat, but would appear to pass through a mass of coal substance at a temperature lower than that at which the products were liberated. It will be recognized that, to produce the highest yield of permanent gas from the coal carbonized, it is not only necessary to subject the mass to a very high temperature, but the primary products on their travel to the off-take pipe must be brought under the influence of further heat, so that the portion of the volatile products which would simply condense out in a cooler atmosphere will to some extent be decomposed into permanent gas. Whereas there is no limit of temperature to which the residual coke may be heated, the same cannot be said of the volatile products (principally the primary ones), as the influence of the heat, and the nature of the solid surfaces with which they come into contact affect the resultant gaseous and liquid products. But the presence of a large amount of hydrocarbons of the paraffin series in the tar produced by coal carbonization in vertical retorts proves to a great extent that the volatile products are not subjected to the degrading influences of heat within the retort.

As an economic measure during the war, steaming in vertical retorts was introduced. This has proved very desirable, and continues in the majority of installations. The conditions existing within the vertical retort are not such as lend themselves to the best results being obtained from the steam-carbon reaction. The completion of this reaction depends to a great extent upon temperature. The temperature required cannot be provided in the vertical retort. No method of supplying heat externally has so far proved capable of bringing about the conditions necessary for this endothermic reaction. Apart from increasing the yield of gas, the presence of this water-gas reaction plays a very important part in the preservation of valuable products—principally ammonia. Being an endothermic reaction, it would seem that the steam, involving as it does an absorption of heat, exercises a cooling action within the retort, and protects the ammonia vapour from the influence of heat above 800° C. It is known that the continuous vertical retort differs from the horizontal type in the respect that there is no stage throughout the whole period of distillation when the temperature of the coal mass assumes that of the retort walls, and so the principal degrading influence is eliminated. The steam (no doubt in excess of that able to take part in the water-gas reaction) admitted at the base, and travelling throughout the length of the retort, provides a shield, and so protects and sweeps away the ammonia from influences which would threaten to destroy it in its passage to the outlet. Apart, however, from increasing and preserving the gaseous products, the admission of steam reduces the quality of the coke. This may be due to the steam having a destructive influence upon the coking properties of the coal.

Now that the Gas Regulation Act has practically been enforced upon municipal undertakings—in some instances its adoption having been more from enforcement than desire—the calorific value to be declared has been rather a difficult problem in many cases. The declaration of the calorific value to be supplied cannot be decided by the conditions existing at the moment. A longer view must be taken, and the position of affairs in time to come foreseen. I believe the difficulty of this problem is greatly increased in the case of those undertakings carbonizing with vertical retorts. My reasons for making this statement are as follows: Where a new bench of vertical retorts has been installed, and likewise in the case where the retorts have been completely renewed, it is found that the gas at first produced is of a fairly high calorific value. As time goes on, however, it is found that the calorific value of the gas produced is slowly but surely decreasing, no doubt due largely to the ever-increasing wear and tear of the retorts; and in the course of years the highest calorific value which is practicable and possible to obtain and maintain is greatly reduced. It is obvious that the vertical retort, possessing as it does a large area of jointing, must in course of time depreciate to a great extent, forming unsealed openings between the innumerable bricks and courses, making it such that the gaseous products within the retort are not without degrading outside influence, particularly in the form of producer gases. It is extremely difficult to detect these open cracks and joints, and perhaps still more so to repair them, except where they occur at the top of the retort, so that it almost remains a matter of having to make the best of prevailing circumstances. This decreasing calorific value has, I believe, been the experience of many, making those who would of desire declare a medium calorific value (of, say, 470 B.Th.U.) of necessity declare one somewhere in the region of 420 B.Th.U. This is unfortunate, for the production and distribution of a gas of medium calorific value meets the economic and consumer's points of view best. What is to be the remedy? Must the steaming of charges be curtailed, and in some cases cease to be practised? The range of calorfic values from which the value to be declared may be chosen is certainly not wide, and not to be compared with that offered by horizontal-retort practice. This state of affairs in vertical-retort practice would appear to be more evident during the summer months, when the load and number of retorts working are small; but as these increase, it will be found that the calorific value also increases slightly, possibly due to the larger production diminishing the proportion of inerts in the resultant gas.

I believe it will also be the experience of those carbonizing with vertical retorts, that, when the calorific value has fallen below that declared, and there is possibility of a "spot penalty" being incurred when the 6 p.ct. figure is reached, it will be difficult to raise the value of the gas in the time allowed by the Act. I do not think the vertical retort lends itself to such rapid fluctuations. The fact that the gas produced by vertical retorts over a considerable period of time is of very constant calorific value is certainly a great advantage.

### The Water-Gas Plant.

The gas industry made one of its greatest advances in science and manufacture when the production of water-gas was introduced. When this gained a firm footing, and proved to be an economic process, great were the expectations; and these, I am sure, have been, and are being, realized now more so than ever before. This process has proved to be one by means of which the heat energy of the coal may be realized in the form of a permanent gas in the minimum of time, and with the minimum expenditure. Water-gas manufacture is being practised in vertical retorts and in separate plants; and it is the latter method with which I propose to deal in this paper. I do not intend to consider in detail the steam-carbon reactions resulting in the formation of water gas, this having been treated in an excellent manner by Mr. Hall in a paper presented last session. As to the magnitude of the process, it may be of interest to mention that approximately 25,000 million c.ft. are generated annually in this country; plant capable of producing almost 20 million c.ft. per day being installed at the Beckton Gas-Works.

It has been described as a great economic process, but, as in all things, it is possible for it to be otherwise. I look upon the production of blue water gas as an extremely sensitive operation. The conditions prevailing have a far-reaching influence upon ultimate results. If efficient and economic operation of the plant is desired, careful attention should be given to what would appear to be features demanding only secondary consideration. In the purchase of coal, those in authority are extremely careful to demand raw material possessing qualities most suitable for gas-making purposes, for their choice will certainly reflect upon the results obtained. Why is it that the material supplied to a water-gas plant does not receive similar consideration? Does not the quality of material influence the results for good or bad, in a manner similar to that of the coal-gas plant? If unsuitable fuel is supplied to a water-gas plant, nothing other than poor results should be or need be expected.

Before being put into the generator, the coke should be carefully graded, as it is necessary that small coke and breeze should be eliminated, for this usually contains a high percentage of ash, and may give clinkering trouble. The coke should, if possible, be of uniform size and shape. Employing coke possessing these qualities, the blast is able to penetrate the coke mass more rapidly, due to the open nature. Thus the temperature of the fuel-bed is raised more quickly. In like manner, the steam admitted during the run period is able to penetrate more easily the porous structure of the coke, and so produce higher gas yields. When using small coke, the fuel bed is very dense, setting up a high resistance to the air and steam blasts, and causing the results obtained to be lower than is the case with a good-sized uniform coke and open fuel bed. The ash content of the coke usually demands consideration, particularly its fusibility. It is only in actual practice that coke possessing ash qualities able to withstand the severe heat treatment within the generator is discovered.

Another feature which should receive consideration is that of the blow period. It is laid down as a rule in certain types of water-gas plant that the blow period shall be of one minute duration; but this, in my opinion, should not be adhered to strictly, as it is possible to effect a great saving in this direction, at the same time increasing the efficiency of the gas production of the plant. When one recollects that just under 50 p.ct. of the coke is consumed during the blow periods, it will be easily understood that to shorten each blow by (say) 15 seconds will be to effect a saving of 25 p.ct. of the fuel consumed during the blow periods. By giving careful attention to this point, it will be found that the results are greatly increased.

In good blue water-gas practice a calorific value of 290 to 320 B.Th.U. per c.ft. may be obtained. Hence, the gas produced can only be used as a diluent, and it is as such that water-gas has found its place in modern carbonizing methods. For the purpose of diluting a high-grade gas to that of lower and

medium grade, blue water-gas is admirably suited. Since the introduction of the water-gas plant working in conjunction with horizontal retorts, what at one time was a process entailing high labour charges, and, consequently, high selling price, has now proved to be a very economic process; the heavy labour charges being neutralized by the greatly increased output. I hold that the dual process of horizontal retorts and water-gas plant is the most efficient and most economic method of gas production. The best results, as regards calorific value and yield of heat energy of the coal, are being produced by this method at the present time. Further, I hold that no other present-day process of coal carbonization has so far proved as capable of producing results to satisfy the demands of modern requirements, as regards suitability of calorific value and realization of the larger portion of heat energy of the coal in the form of a permanent gas.

In some works as much as 40 p.ct. of water gas is being added, and the resultant gaseous mixture still retains a calorific value of about 470 B.Th.U. per c.ft. Where it is possible to add such a large percentage of water gas to the coal gas, the total potential heat of the coal realized in the form of gas must be very great, and consequently the fuel bill must show a considerable reduction. What must be the result? Is it not low cost of production? It may be argued that with this reduced amount of coal carbonized annually, through greater liberation of heat in the form of gas, there must be a corresponding reduction in residual products available for sale. This must certainly be so, but with the state of present markets, is it bad practice? I look upon it as a boon to those who do not adopt such means, as it must provide for them a more open market, readier sales, and a steadier price than would be the case if water gas was not manufactured in such large proportions to the total gas made in some works. Will this mean that there are still greater possibilities ahead for horizontal retorts worked in conjunction with the production of blue water gas? Under the new regulations it would certainly seem that this method of gas production is admirably suited in every way to conform to the demands of the new Act.

### Discussion.

Mr. DAVID FULTON (Helensburgh) said that the author was apparently an advocate of horizontal retorts. This, he acknowledged, was quite a good plan where it was possible to draw upon good coking coal. With regard to the "free" space within the retort bringing about decomposition of products, research had proved that radiant heat did not cause decomposition to a great extent. It seemed to be principally due to contact with highly-heated retort walls and coke. It was now the common practice to remove the division plate from vertical retorts, as this served no purpose in connection with decomposition. So far as the point had been raised about the quality of fuel for water-gas purposes, he thought everyone attempted to supply the most suitable coke for this process.

Mr. JAMES BELL (Dumbarton) spoke of the method of carbonization in the chamber oven, and emphasized the manner in which the manufacture of water gas influenced to a great extent the coke market.

Mr. JAMES HALL (Temple) alluded to the loss in the thermal efficiency of water-gas production due to cold coke being used in the generator. He took the view that the thermal efficiency would be greatly increased if it were possible to supply the generator with hot coke. To his mind, the calorific value of gas produced by vertical retorts was very constant, and less difficult to maintain than that produced by other plants.

Mr. M'GOWAN (Dalmarnock) remarked that it was more difficult for the larger undertakings to supply a good quality of coke for water-gas purposes, as the quality of the numerous classes of coal carbonized varied so widely.

Mr. JOHN FRAZER (Dalmarnock) observed that in present-day practice with horizontal retorts very little "free" space existed, as it was the custom to charge the retort as full as possible. Gas of 520 to 550 B.Th.U. could be obtained in vertical-retort practice, but the volume secured by producing this high-quality gas would be greatly reduced, and it possibly might prove to be an uneconomic method.

Mr. JAMES DICKSON (Kirkintilloch) spoke of his experience with the dual process of horizontal retorts and water gas He contended that the results obtained from this system of gas production were far in excess of those possible from vertical retorts. Since introducing water gas, the quantity of coal carbonized annually at Kirkintilloch had fallen considerably. This was a circumstance which was entirely due to the excellent results which were being obtained from a combination of the separate processes. Speaking from his own experience, he was bound to admit that the same results could not be secured or expected in vertical retort practice.

A few of the speakers joining in the discussion complimented the author on the boldness of his assertions, and he was congratulated on having the courage of his convictions.

Mr. GRAY briefly replied.

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**Employee Stockholders.**—Over 65 p.ct. of the employees of the Columbia Gas and Electric Company, and the various operating subsidiaries (the Union Gas and Electric Company, the United Fuel Gas Company, &c.) are now stockholders in the parent Company, according to a statement made by "Hail Columbia"—the magazine published by the Company for the benefit of the employees, stockholders, and customers. It is pointed out that the percentage of shareholders is even more impressive if only the permanent employees are taken into account, inasmuch as over 90 p.ct. of them, and practically all of those who come in contact with customers and the general public, are active stockholders in the undertaking they represent. In all, 36,500 shares in the Columbia Company have been purchased by employees; and it is believed that this constitutes a record for public utility companies.

# CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

## Mr. E. V. Evans' Cantor Lectures.

SIR,—Mr. E. V. Evans' lecture published in last week's issue of the "JOURNAL" was interesting to read and to listen to. Being a member of the North of England Institute of Mining and Mechanical Engineers, I recall a paper read before that Institute in August, 1921, by Mr. John Roberts. The theory expounded by Mr. Evans is practically the same as that put forward by Mr. Roberts; the language and illustrations showing a striking parallel.

Mr. Roberts showed: (*a*) That the expansion of coal could be prevented by the use of blends of coal and coke breeze; (*b*) the resulting coke is an improvement on that made from raw coal alone, being of greater uniformity in texture and of greater crushing strength; (*c*) heat penetration is improved as a result of blending, due to the destruction of the plastic layer, or what Mr. Roberts called the "decomposition zone." He produced conclusive evidence that the carbonizing period was reduced when breeze was mixed with coal. I was therefore surprised that Mr. Roberts' valuable work was not mentioned in this connection, but merely as having expressed an opinion as to the virtues of the fuel.

I was under the impression that it was usual for scientific investigators to acknowledge prior publications in cases of this sort.

24, *Windermere Road, Ealing, W.* 5, W. H. ATKINSON.
*March* 17, 1924.

# REGISTER OF PATENTS.

## Sealing-Liquid Collectors for Tankless Gasholders.

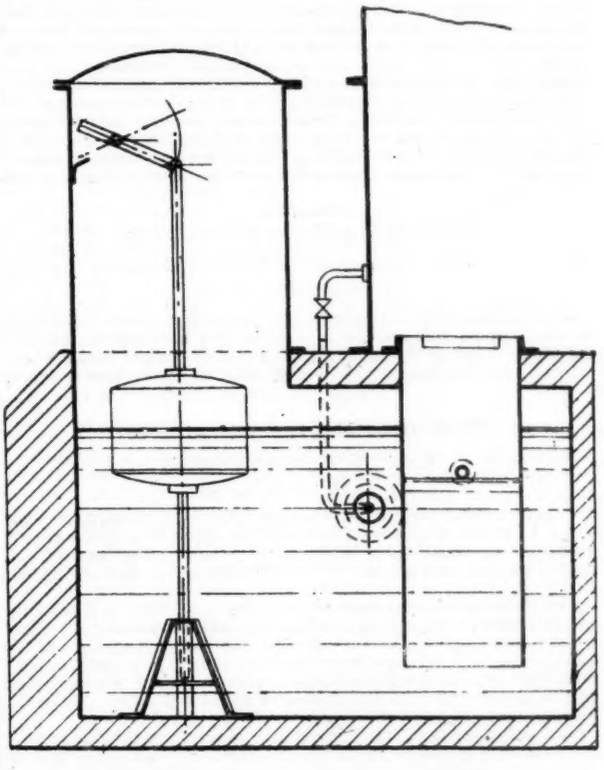
### No. 210,037.

MASCHINENFABRIK AUGSBURG-NURNBERG, A. G., of Nurnberg.

No. 15,532; June 14, 1923.

Convention date: Jan. 20, 1923.

This specification covers an arrangement for collecting the tar used for sealing the "piston" in what have been known as "tankless" gasholders. An article desciptive of the latter appeared on p. 268 of Vol. CLIX. of the "JOURNAL." In such holders tar is kept continually running over the periphery of the movable disc and down the inner surface of the holder; and means must be provided for keeping this tar in circulation.



Collecting the Sealing Liquid of a Tankless Gasholder.

This is effected, according to this invention, by providing at intervals round the holder collecting tanks such as the cross-section herewith shows. It will be seen that a large-diameter dip-pipe extends nearly to the bottom of the vessel; the pipe being big enough to allow separation in it of water and lighter impurities from the tar. These are run off through the outlet shown. Adjacent to the dip-pipe may be seen a tube extending through the tank. In this tube may be burnt a jet of gas drawn direct from the holder, which is employed to

prevent freezing during severe weather. The float on the left is for the purpose of setting in motion, through the medium of levers, &c., the pumps for recirculating the tar.

Another feature is the provision of a weir, adjustable from outside, above the dip-pipe; for, say the patentees, "Owing to the very large dimensions of the gasholders built nowadays, it is found that the bottoms of such gasholders are very subject to subsidences and other disturbances, which have the result of causing the overflowing sealing liquid to accumulate only on one side of the gasholder, unless special means are adopted to deal with such eventualities."

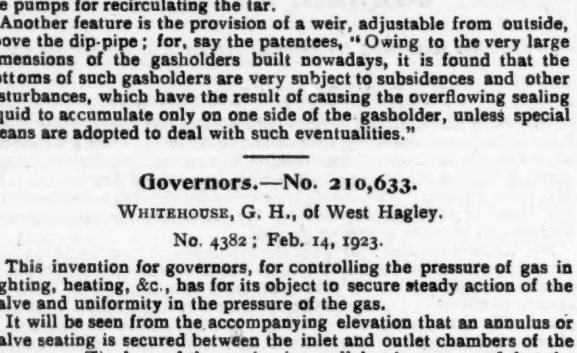
## Governors.—No. 210,633.

WHITEHOUSE, G. H., of West Hagley.

No. 4382; Feb. 14, 1923.

This invention for governors, for controlling the pressure of gas in lighting, heating, &c., has for its object to secure steady action of the valve and uniformity in the pressure of the gas.

It will be seen from the accompanying elevation that an annulus or valve seating is secured between the inlet and outlet chambers of the governor. The bore of the seating is parallel at its upper end, but the lower portion is tapered or flared. A number of lateral apertures with V shaped extensions are formed through the wall of the annulus.



Whitehouse's Governor.

The disc valve is of such diameter as to seat at the juncture between the parallel and tapering portions of the bore, and is connected to the leather diaphragm. The latter is loaded to keep the valve open until the pressure of the incoming gas is above the pre-determined pressure desired on the outlet side of the valve. On the occurrence of such an excess pressure the valve will be automatically closed; but such closing and subsequent opening will be effected by a steady movement, due to the conical central bore and to the lateral apertures with V shaped extensions. The conical bore also provides for a balancing of the pressures on the respective sides of the valve until the latter is in actual contact with its seating, inasmuch as a communication is provided between the two sides or faces of the valve until actual contact occurs.

## Upright Mantles.—No. 210,825.

CARTWRIGHT, G. H. & D., both of Birmingham.

No. 27,633; Nov. 13, 1922.

The patentees claim an upright incandescent gas-mantle mounted on a collar adapted to fit over the burner head and provided with projecting pieces to rest on the burner head, and with upright pieces which support a circular imperforate flat piece which acts as a flame spreader.

## Treatment of Tar.—No. 210,909.

VIVIAN, A. W. H., of Rochester.

No. 32,174; Nov. 24, 1922.

This invention refers to the treatment of liquid hydrocarbons, such as tar, by means of acids and solvents. Its object is to obtain certain products such as a binder for briquetting coal, binding material for road work, &c., material for certain electrical goods, and the lighter tar oils.

The tar is heated to a temperature of about 190° Fahr. in a nitrating pan or container which is jacketed and has inside it a lead coil. Cold water or steam can be put into the jacket and lead coil, as required, by means of suitable valves. In the centre of the pan is a vertical shaft, controlled by bevel gearing and supported from above. On the lower end of the vertical shaft is a cross-piece to act as a stirrer, and at the bottom of the pan is an outlet with a valve.

To the heated tar is added 5 to 8 p.ct. of sulphuric acid, according to the quality of the tar; after which about 2 to 3 p.ct. nitric acid is added. When the action of the acids is completed, paraffin oil is added in sufficient quantity to reduce the viscosity to requirements. Steam is then shut off, and the mixture allowed to stand for about ten minutes, after which it is cooled as quickly as possible—*e.g.*, by passing a cooling medium through the coil and/or jacket of the pan. Separation is thus effected; the binding material separating out and sinking to the bottom, while the lighter oils rise to the surface, and may be drawn off into a still where fractionation may be carrried on, or other treatment. Water is then added to the binding material left in the nitrating pan, in order to wash out any acid present, for which purpose the whole mass may be boiled. The quality of the binder is varied as required—*i.e.*, if a hard binder is wanted, the washing is carried out at a higher temperature, with repeated washings. About 5 to 8 p.ct., of a suitable alkali may be added to neutralize the acid present.

After washing and settling for about five minutes, the water is syphoned off, and the binder run off to moulds through the opening in the bottom of the pan.

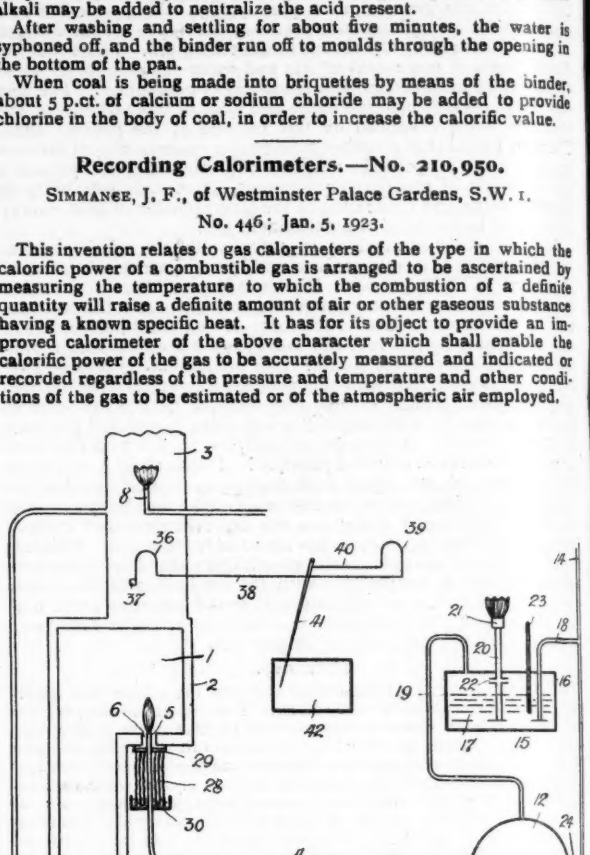
When coal is being made into briquettes by means of the binder, about 5 p.ct. of calcium or sodium chloride may be added to provide chlorine in the body of coal, in order to increase the calorific value.

## Recording Calorimeters.—No. 210,950.

SIMMANCE, J. F., of Westminster Palace Gardens, S.W. 1.

No. 446; Jan. 5, 1923.

This invention relates to gas calorimeters of the type in which the calorific power of a combustible gas is arranged to be ascertained by measuring the temperature to which the combustion of a definite quantity will raise a definite amount of air or other gaseous substance having a known specific heat. It has for its object to provide an improved calorimeter of the above character which shall enable the calorific power of the gas to be accurately measured and indicated or recorded regardless of the pressure and temperature and other conditions of the gas to be estimated or of the atmospheric air employed.




A "Simmance" Recording Calorimeter.

According to the principal feature of the invention, the combustible gas is arranged to be positively supplied and burnt at a definite constant rate of volume, the heat of the products of combustion being absorbed by a stream of air the flow of which is induced and controlled by an automatic controlling valve so as to be also constant; the relative volumes of the gas and air thus employed being immaterial as affecting the action of the apparatus, and being determined solely as regards convenience in measuring the temperature to which the air is raised by the combustion of the gas.

Omitting the detailed description of the proposed instrument, we give the patentee's account of the operation of the apparatus, referring to the diagram of one form thereof.

The combustible gas is supplied to the apparatus from the supply pipe 14, and, passing through the branch pipe 18 into the tank 16, bubbles through the water 17 contained in the tank. By this means, the gas leaving by the pipe 19 is fully saturated with water vapour, and is, moreover, somewhat raised in temperature owing to the water 17 being maintained at a higher temperature than the external air by conduction through the pipe 20 from the burner 21. The latter also ensures, as will be readily understood, that the gas within the upper part of the tank or receptacle 16 is maintained at atmospheric pressure; the burner 21 constituting a free communication between the interior of the tank or receptacle 16 and the external air. The combustible gas in a heated and fully saturated condition leaves the tank 16 by the pipe 19, and enters the meter drum 12 in which the gas is cooled to substantially atmospheric temperature with a consequent condensation of a portion of the water vapour carried by the gas within the meter drum 12. This condensation serves to maintain a small continuous supply of water in the interior of the meter drum 12, the level of the water within this drum being maintained constant by the provision of the overflow pipe 24.

The meter drum 12 is rotated at a constant speed by means of the motor drum 13 [the drums are mounted on a common spindle], the speed of rotation of which is maintained constant by a governor 27. The

combustible gas is thus delivered from the meter drum 12 to the pipe 4 and burner 5 at a constant rate of volume and in a fully saturated condition, the gas thus delivered being furthermore at the normal atmospheric pressure and temperature. The air supplied for combustion entering the combustion chamber 1 through the aperture 6 passes through the screen of moist strings 28, and is thus also fully saturated and at the normal atmospheric temperature and pressure. The gas to be estimated thus undergoes combustion at the burner 5 under absolutely normal conditions, the heat developed by this normal combustion being wholly absorbed by the combustion chamber 1 and transmitted therefrom to the upward flow of air in the air chamber 2 surrounding the combustion chamber 1.

The air supplied to the air chamber 2 is caused to pass in an upward stream through this chamber past the walls of the combustion chamber 1 by the action of the burner 8, which causes an up-draught within the flue or shaft 3. The air entering the lower part of the air chamber 2 is controlled so as to have a constant rate of volume by means of the device 9, the in-coming air entering the upper part of the cylinder 33 and impinging upon the upper surface of the disc 32. The downward pressure thus exerted upon the disc 32 tends to close the balanced valve 31, which owing to its double construction is unaffected by the pressure of the air passing through the valve. The air entering the cylinder 33 passes round the edges of the disc 32, and thus causes what may be termed a peripheral downward drag upon the disc, in addition to a downward suctional action upon its under surface, owing to the flow of the stream of air past the edge of the disc. It will be seen that the disc 32 is subjected to a downward pull or thrust due to the action of the in-coming air upon its upper and lower faces, and also upon the edge thereof; this downward effort being counterbalanced by the adjustable counterweight 35 in such a manner as to ensure a supply of air to the air chamber 2 at a constant rate of volume regardless of variations in the amount of up-draught created by the burner 8. It is found in practice that by suitable adjustment of the form and dimensions of the disc 32, and by adjustment of the counterweight 35, the device 9 can be arranged to cause a substantially constant rate of volume of air to be supplied to the air chamber 2, in spite of relatively large variations in the up-draught created by the burner 8; and the rate at which air passes through the air chamber 2 can thus be arranged to be substantially constant under all conditions obtaining in practice.

The stream of air absorbs the heat generated by the combustion of the gas in the burner 5 so that the temperature of the air leaving the air chamber 2 and entering the lower part of the flue or shaft 3 is an accurate measure of the calorific power of the gas. The temperature of the air issuing from the air chamber 2 is measured by means of a differential thermometer device; the heated air causing an expansion of the U shaped strip 36, which is transmitted through the horizontal bar 38 and thence to the recording arm or pointer 41.

The remainder of the specification and drawings elaborates the above, deals with possible modifications, and enumerates the claims.

### Prepayment Meters.—No. 210,965.

TAUNTON, R. P., and M'INDOE, R. W., both of Birmingham.

No. 1600; Jan. 18, 1923.

The object of this invention, for prepayment meters, is to provide "an improved construction of epicyclic measuring mechanism which is simple in operation and efficient in use and enables existing meters to be altered with the minimum of trouble and labour."

The cut-off valve is controlled by means of improved epicyclic gearing comprising a rotary disc or plate disposed on the ratchet wheel of the prepayment mechanism, the ratchet wheel having a toothed annulus with which a planet wheel on the rotary disc engages; and a sun pinion in mesh with the planet wheel has an operative connection with the cut-off valve mechanism. A feature consists in providing the rotary disc with a gear wheel at the back, which is connected with the meter-driven shaft to transmit the motion of this shaft to the cut-off valve mechanism. The motion imparted to the ratchet wheel of the prepayment mechanism by a coin acting as a clutch between the handle and the ratchet wheel, and the motion of the meter driven shaft, is transmitted through the improved gearing to the cut-off valve mechanism.

## APPLICATIONS FOR PATENTS.

**[Extracted from the "Official Journal" for March 12.]**

Nos. 5367 to 6035.

BARRALET, T. E.—"Flue pipes for geysers." No. 5481.
BIBBY, J.—"Filtration of gas, &c." No. 5668.
CROSS & SONS, LTD., W.—"Gas stoves, grillers, &c." No. 5717.
CUTT, C.—"Suspension means for gas, electric light, &c., fittings." No. 5977.
GIBON, W.—"Gas-burners." No. 5557.
GOFFIN, E.—"Manufacture of coal gas." No. 5970.
KEITH, G.—"Diaphragm loading arrangement for gas-governors, &c." No. 5590.
KEITH, G.—"Grill or gas-cooker." No. 5596.
KEITH & BLACKMAN CO., LTD., J.—See Keith, G. No. 5590.
KEITH & BLACKMAN CO., LTD., J.—"Combined fan and turbine." No. 5591.
KEITH & BLACKMAN CO., LTD., J.—See Keith, G. No. 5596.
KIRBY, J. I.—See Cross & Sons, Ltd., W. No. 5717.
KOPPERS, H. [Firm of].—"Ovens for distilling fuel." No. 5449.
MATTHES, E.—"Adjustable nozzle for gas-burners." No. 5435.
NEW GEYSERS, LTD.—See Barralet, T. E. No. 5481.
NEW GEYSERS, LTD.—"Water joints for geysers, &c." No. 5482.
NODDINGS, H. S.—See Gibon, W. No. 5557.
ROECKNER, M.—"Pipe joints." No. 5546.
SILBERMANN GES., A.—See Matthes, E. No. 5435.
TESSIERAS, E.—"Naphthalene liquefiers and carburettors." No. 5859.
TWIGG, C. H.—See Cutt, C. No. 5977.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

### Gas Regulation Act.

On March 13 the Draft Special Orders proposed to be made by the Board of Trade under the Act, on the application of the Brierley Hill District Gas Light Company, the Melksham Gas Light and Coke Company, and the Newquay (Cornwall) Gas Company, were approved.

### Public Utility Companies (Capital Issues) Act.

A copy was presented of a report to the Board of Trade under the Act on an application by the Grantham Gas Company.

## HOUSE OF COMMONS.

### Gas Regulation Act.

On March 13, a copy was presented of a Statement of Objection, deposited with the Board of Trade by the London, Midland, and Scottish Railway Company, the London and North-Eastern Railway Company, the Great Central and Midland Joint Committee, and the Great Central and North Staffordshire Railway Committee, to the Special Order proposed to be made by the Board of Trade under the Act on the application of the Marple Urban District Council.

### Gas Mantles.

Mr. FOOT asked the President of the Board of Trade if he had received an application for the appointment of a committee under the Safeguarding of Industries Act (Depreciated Currency) to consider the removal of the duty of 33⅓ p.ct. imposed on imported gas mantles, on the ground that the German currency was now on a dollar basis; and if so, what action he proposed to take?

Mr. WEBB stated that he had received an application of the nature indicated, and was awaiting some further information for which the applicants had been asked.

Sir FREDRIC WISE asked the President of the Board of Trade how much revenue had been received each month since April 1, 1923, from the gas-mantle trade under Part II. of the Safeguarding of Industries Act?

Mr. SNOWDEN replied that the net amount of duty received under Part II. of the Act on mantles for incandescent lighting and component parts thereof during each of the months April, 1923, to February, 1924, inclusive, was as follows: 1923—April, £2450; May, £1595; June, £1898; July, £1909; August, £3098; September, £3941; October, £5432; November, £4626; and December, £4187; 1924—January, £3721; February, £3110.

### Nitrogen Fixation.

Mr. HAYDAY asked the President of the Board of Trade whether he was aware that the French Government had recently concluded an agreement with the German Badische Anilin und Soda Fabrik for the exploitation of methods of manufacturing synthetic ammonia; and whether, in view of the great importance of being independent of foreign supplies of nitrates, the British Government had taken or intended to take similar steps?

Major MOULTON asked the Prime Minister whether his attention had been drawn to the acquisition by the French Government of the patents and technical information necessary for the production of nitrates by the Haber-Bosch process, with a view to that Government's producing such nitrates on a very large scale; and whether the British Government proposed to take any, and what, steps to promote large-scale production of nitrates in this country?

The SECRETARY OF STATE FOR WAR (Mr. Stephen Walsh) said he had been asked to reply to these questions. Attention had been drawn to the matter referred to in the first part of the questions. Similar steps had been taken by the British Government in conjunction with a British firm.

Major MOULTON: Is it not a fact that the steps which have been taken by the French Government are producing 120,000 tons of nitrates each year?

Mr. WALSH: I can only say that this is a matter of great public interest, and at present, as it is entirely confidential, it is not in the public interest to give any further information.

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**Reduction at Barnoldswick.**—The Barnoldswick District Council have decided to reduce the price of gas, following a decrease in December of 6d. per 1000 c.ft. From April 1, the price will be reduced a further 2d. per 1000 c.ft., making the net price 3s. 4d. for ordinary meters, and 3s. 8d. for prepayment ones.

**London Street Repairs.**—The annual report of the Metropolitan Committee on Materials and Means of Paving the Streets of London calls attention to the injurious effect of the frequent tearing up of the roads by public companies, and also to the serious obstruction and inconvenience caused thereby to the travelling public. It is the opinion of the Committee that more effective control and co-operation are urgently needed to prevent the continual breaking-up of the public thoroughfares; and it is suggested that the present unrestricted rights of statutory bodies and companies in this respect should be controlled by giving fuller powers to the road authorities. In the Committee's opinion, "no statutory body or company should have power to break open any newly-constructed or reconstructed road until after the lapse of a definite time—say, 12 or 18 months—from the date of construction or reconstruction, without the special consent of the local authority concerned, except in cases of necessity, such as burst pipes, &c. This restriction would, at least, doubtless have the effect of ensuring that any works as to mains, pipes, &c., would be carried out either prior to or at the same time as the paving works are in progress, and thus tend to economical working and the prevention of unnecessary and increased obstruction of the highway."

# MISCELLANEOUS NEWS.

## SHEFFIELD GAS COMPANY.

The Annual General Meeting of the Company was held on Monday of last week in the Offices, Commercial Street, Sheffield—Colonel H. K. Stephenson (the Chairman) presiding.

The Chairman, in moving the adoption of the report and accounts for the year 1923, said it gave him great pleasure to put before the proprietors the record of another successful year's working of the undertaking. There was a balance of £8741 to be added to the amount previously carried forward, after providing for the dividends. This result, when considered in relation to the notable reductions which had taken place in the price of gas during the year, would, he hoped, be satisfactory to shareholders and consumers alike.

### LOW PRICE OF GAS.

When they met this time last year, the price of gas had already been reduced to 10d. per therm, and since that date further reductions which had been made had brought the price down to 7⅘d. per therm, or 3s. per 1000 c.ft., for domestic supplies, with proportionate reductions to large consumers, the lowest price being now 4⅝d. per therm, or 1s. 11d. per 1000 c.ft. He believed this price was one of the lowest in the country, and must be considered very satisfactory, especially when it was remembered that the Company had not now the same opportunities of buying cheap coal which they enjoyed before the war, when they reaped to a fuller extent the advantages of their geographical position. In those days there was a large surplus of gas coal of which the Company were able to avail themselves at comparatively low prices, whereas to-day they had to buy in the open market. When comparing the present prices of gas with the pre-war price, people should make a similar comparison in regard to coal, for coal was the dominant factor. For the reason he had indicated, the prices which the Company now had to pay for coal showed a greater advance than in the case of other similar undertakings which did not enjoy the pre-war advantages to which he had referred. At the last shareholders' meeting, when discussing the Company's 1922 Act, he informed them that, in accordance with the provisions of the Act, when the price of gas was reduced below the basic rate of 7d. per therm, the shareholders and employees might hope to reap some benefit. In spite of the fact that, as he then pointed out, 7d. per therm was the lowest basic rate which had been fixed for any gas undertaking, he was glad to say they had been able to reduce the price below this figure, with the result that there was a small extra sum for distribution. Under the 1922 Act, an amount equal to one-third of the difference between the basic rate and the selling price might be divided equally between the shareholders and the employees. The shareholders received the usual interim dividend of 2½ p.ct. for the half-year ended June 30, 1923, and would now receive a final dividend for the six months to December of £2 14s. 2d. p.ct., making a total distribution for the year of £5 4s. 2d. p.ct. The 4s. 2d. was the amount accruing to the shareholders as the result of the reduction in price below the basic rate. Concurrently with this reward of virtue to the shareholders, the employees would get their share under the co-partnership scheme, which now came into operation.

### INCREASED GAS SALES.

The consumption of gas during the year was 4,358,516,000 c.ft., being an increase over the previous year of 219,923,000 c.ft., or 5·31 p.ct. This increase was mainly due to the expansion of domestic consumption. In spite, however, of adverse trade conditions, 45 additional furnaces were supplied and fixed during the year. The quantity of coal carbonized was 377,000 tons, producing, in addition to the gas supplied, some 200,000 tons of coke, 20,000 tons of tar, and over 4000 tons of sulphate of ammonia. If electricity had been employed for all the purposes for which the Company had sold gas during the year, some 126,000 tons more of coal would have been consumed, and the 20,000 tons of tar and 4000 tons of sulphate of ammonia would not have been produced.

### PREPAYMENT METERS INTRODUCED.

In all directions the Company had given great attention to the needs of the community, and no new enterprise undertaken by them had shown greater promise than the installation of prepayment meters, which had been commenced during the past year. Not only had 2500 of these meters already been fixed, but the Company had orders on hand for a further 3500. In nearly all cases these were for new customers, involving the laying of service-pipes, while in over 80 p.ct. of the number the houses had to be piped. These orders were being executed at the rate of 150 to 200 a week; but, as further orders continued to come in at a similar rate, it would be seen that there was no necessity to canvass for this branch of the business. Additional men had had to be taken on to cope with this influx of work. It would be difficult to find better testimony to the popularity of gas than this desire for its services on the part of those by whom it had hitherto been unobtainable.

### STREET LIGHTING OF THE CITY.

The Chairman next alluded to the public lighting of Sheffield, on which matter he said: I must now refer to a subject which, since I raised it at the last annual meeting of shareholders, has been a matter for comment and discussion in the Press and elsewhere—I allude to the inefficient lighting of our Sheffield streets, and especially of those in the poorer quarters of the city. A year ago I made, on behalf of the Company, what one of the newspapers described as a "sporting offer" to take over the lighting of the whole or part of the city, with a view to improving matters. That offer was not accepted offhand or with open arms—not, I have reason to believe, because those responsible for the lighting of the city did not appreciate either its importance or its value, but rather because of the magnitude of the difficulties in the way of making the change, as well as of the cost which it would have involved at a time when the finances of the city were so heavily taxed by unemployment. As I explained a year ago, the Company are at the present time responsible only for the supply to the Corporation of the best gas at the lowest price. We have no responsibility for the manner in which that gas is employed. We have, however, already undertaken the conversion of a number of burners in existing lamps at a nominal charge, as well as the maintenance of those lamps for a period free of charge, so as to demonstrate the improvement which can be obtained by the use of modern burners. It has been generally admitted that the results are very satisfactory; but a much greater improvement could be effected if modern lamps fitted with proper reflectors were used. I may mention, as an instance of the inefficiency of the present lamps, that, owing to the smallness of the lamp, the heat of the burners breaks the glass, with the result that the wind damages the mantles, so that the last state of that lamp is worse than the first, and people say what bad gas the Sheffield Gas Company supply. It is a case of putting "new wine into old bottles." Another point I may mention is that at the present time the whole of the street lighting of Sheffield, so far as gas is concerned, is on the low-pressure system. I think that the only high-pressure lamps are those outside our new showrooms in High Street and our offices in Commercial Street. Anybody who knows London well will recognize how efficiently the principal thoroughfares are illuminated by gas, both by low and high pressure, and I think that for important points and thoroughfares gas on the high-pressure system ought to be employed in Sheffield. Although I do not want to emphasize the competition between gas and electricity, I think it is only right the people of Sheffield should know that, while the gas they see in the streets is displayed to the worst advantage owing to obsolete and inefficient lamps, electric lighting has all the advantages of up-to-date fittings, kept in order by the department who supply the current. In putting these facts before you, I am not in any way blaming the Corporation or Committees, because, as a member of the City Council, I recognize that recent years have not been favourable to municipal enterprise of the kind indicated, and I know full well the difficulties involved in a change of this kind. I know, too, that those responsible for the lighting of the city are most anxious to see improvements effected. With this end in view, I understand that a Lighting Engineer is being appointed, whose duty it will be to make the necessary recommendations. Such an official will be welcomed by the Company, and I feel confident that gas will be found to be the cheapest as well as the most efficient agent for street lighting.

### TRIBUTE TO MR. HALKETT AND THE STAFF.

In his concluding remarks, the Chairman said it was hoped before next winter to have eradicated the naphthalene trouble. In the hope of accomplishing this, they were now installing oil washing plant at each of the works. He could not speak too highly of the personal interest and attention which Mr. Ralph Halkett (the General Manager) had devoted to the undertaking, the success of which had been so largely due to his efforts. The record of the year's work was sufficient indication that Mr. Halkett had had much labour and many responsibilities on his hands. He had been ably supported by his staff and by the employees generally; and under the co-partnership scheme now in operation, they might look upon all engaged in the carrying on of the Company as a "happy family."

The report and accounts were adopted, and the dividend indicated by the Chairman in his address was declared.

## HASTINGS AND ST. LEONARDS GAS COMPANY.

Another highly successful half-year's trading was reported at the meeting of the Company, held on March 6, when Dr. G. G. Gray, J.P. (Chairman), presided.

The sale of gas, as compared with the corresponding period, increased 5·83 p.ct. The price of gas will be reduced as from the April readings of the meters by 1d. per therm, bringing the charge down to 11d. per therm. The Chairman said that there had been an increased price for residuals, the greatest increase being in the returns for tar. The total expenditure had been £503 less than in the corresponding half-year. The Company were applying to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act; and a draft of the Order had been prepared. The Directors recommended payment of the following dividends (less income-tax) for the half-year: £6 15s. p.ct. per annum on the 5 p.ct. converted stock, £5 5s. p.ct. per annum on the 3½ p.ct. converted stock, and £6 4s. 6d. p.ct. per annum on the 5 p.ct. additional stock.

A vote of thanks was passed to the Chairman and Directors, and to Mr. C. F. Botley (Engineer and General Manager) and the staff.

## Mantles and the Reparations Tax.

The "Daily Mail" on March 1 said that the rapidity with which German traders have seized on the reduction from 26 to 5 p.ct. of the reparations tax on German imports into Britain is illustrated in letters forwarded to our contemporary by British firms. The reduction of the tax was announced in the House of Commons on the previous Monday. On the following day at least two firms had circularized British merchants. One of them wrote: "We beg to inform you that the reparation question is now settled, as the tax is reduced from 26 p.ct. to 5 p.ct. In consequence we are now again able to re-begin manufacturing for the British market of our specialities." The principal of the firm to which this circular was sent states in a letter to the "Daily Mail" that the actual cost of production of his principal article (incandescent gas-mantles), making no allowances for rates, taxes, and depreciation, is 8s. 6d. a dozen. A German firm copied it so exactly that it was hard to decide which was which, and offered it in January to a London firm at 7s. 6d. a dozen *plus* 26 p.ct. reparation tax. Now the German firm offers it at 8s. a dozen, and throws the British firm's employees on the dole.

At a meeting of the Londonderry Corporation Lighting Committee, it was intimated that the undertaking was now in a prosperous condition, and was able to contribute to the relief of the rates.

# RADIATION LIMITED.

At the Annual Meeting of the Company, held at the Queen's Hotel, Birmingham, yesterday (March 18) the CHAIRMAN, Mr. H. James Yates, in moving the adoption of the report and accounts, said—

On former occasions when I have had the pleasure of giving my annual address to the shareholders of Radiation, I have made reference to a number of important matters which more or less affect our business. This year there are only one or two points to which I would briefly refer.

The unsettled position of our Home affairs, and the situation in Europe and the Middle East—not excluding, of course, Russia—still give rise to uncertainties of trade in this country which continue to cause greater anxiety to those responsible for the management of large businesses. Our continued high taxation is a great drag on the wheels of industrial and commercial progress. This heavy taxation—especially income-tax—is due, in great part, to the large amount lent by Great Britain to various countries during the great war. Let me remind you that the total amount owed to Great Britain by other nations is £1,904,000,000, and in no case has any arrangement been made for repayment, neither have we received any interest. France and Italy alone owe this country approximately £1,140,000,000, and if interest only were paid by them to us on this amount, at (say) 5 p.ct. per annum, it would actually permit our income-tax to be reduced by 1s. in the pound. The quickening of the pulse of trade in this country which would result from this relief can be readily imagined. The debt incurred to the United States by Great Britain was £856,000,000. As you are aware, Great Britain has arranged to repay this debt over a period of 62 years, and this means an additional burden equal to 8½d. in the pound in our income-tax.

Great Britain has established for herself a moral prestige in the world which I am sure, notwithstanding some of the extremist views we hear to-day, no one would like to see weakened. We have done the honourable thing in making arrangements to repay a huge debt which was created, not on our own behalf, but on that of our Allies. As President Coolidge recently said, the effect of this action of ours on business confidence has been world-wide. He said that it was an exhibition of the highest type of international honour, and it showed that the moral standards of the world were going to be maintained. I believe that business men, whatever their views upon public affairs, must be agreed that any Government in power in this country ought to spare no effort in order that other countries, who owe us great sums of money and have hitherto taken no steps whatever towards payment even of interest (to say nothing of the principal), may be persuaded to recognize their obligation in this matter, particularly seeing that their peoples are not suffering from unemployment in the way that our people are suffering—largely on account of these vast debts owing to us. Before leaving the subject of taxation, I would just remind you of the fact that this Company pay the present heavy income-tax before the dividend on the ordinary shares.

### THE "NEW WORLD" COOKER.

Last year I gave at some length particulars of the Radiation type of boiling burner in gas-cookers, and referred to its advantages as compared with the drilled-ring burner, and also to our new type of gas cooker called the "New World," which many of you inspected at the close of our meeting. This new cooker, as I then told you, is the outcome of many years of research work, which had cost your Company many thousands of pounds. It is entirely new in principle and in methods of construction. Conservative though we Britishers are apt to be, and loth at times to take up new ideas, the way in which the "New World" cooker has been adopted all over this country and abroad has already more than justified its existence, and has far exceeded our most sanguine expectations. The numerous unsolicited letters of congratulation we have received regarding it have been extremely gratifying to those who have been responsible for its production. For the information of those of you who may not yet have seen it, I should like to recall briefly one or two of its outstanding features. The Radiation cone flame burner, known as the "Rado" burner, has, I believe, finally made an end to all adverse criticisms which have been made upon it. It can do everything that the existing drilled-ring type of burner can do, and more—and that at a considerable saving in the cost of gas. It is a well-known fact that, if the inner cone of an atmospheric or bunsen flame be in any way broken during low-temperature operations such as boiling, then, as a natural and inevitable consequence, the completeness of the combustion is seriously interfered with. Our burner has been so designed as to avoid this possibility of poor combustion. The flame is clearly defined when first adjusted, and remains perfect in use, and the retention of its efficiency is ensured. We have been experimenting with this burner for a number of years, and we have now brought it to a high state of perfection; and I honestly believe that this type of burner is destined to be the gas boiling burner of the future.

The oven of the "New World" cooker has striking features of advantage which are quite original and are found in no other gas-cookers. The gas flames do not "smother" or go out as the result of increased pressure of gas. The flue outlet can never become choked up, and if the flue is connected to the chimney the cooking space is not affected by either "pull" or down-draught in the chimney; neither have these any effect on the flame, as all the cooking is done above the oven flue outlet, and only the air used for combustion passes into the cooking space. In short, the cooking operations in the oven may be said to take place as if under an inverted bowl, and they can be carried on in the bottom portion of the oven equally as well as at the top. Perhaps one of the outstanding advantages is the automatic control effected by a device which is attached to the oven and is called the "Regulo." This permits the temperature of the oven to be set at any point required for the cooking of food, so as to ensure that the oven is heated to the required extent, and maintained at that heat all the time. Once the food is put in, no further attention is needed until the end of the cooking period. This allows a maid or housewife perfect freedom to do other work while the process of cooking is going on.

Now the "New World" cooker is of so high a grade and made in such sizes as not to be adapted or intended for adoption universally in all classes and sizes of houses, and ever since the experimental work on this apparatus was completed, we have been endeavouring to devise a method of embodying the outstanding valuable features of this cooker in a less costly type—in other words, to make cookers for the million at a price for the million. This, I am glad to tell you, we have now achieved—with a success going beyond even our most sanguine hopes. The plant for these less expensive cookers is now gradually being installed in our various works. This new gas-cooker—which is named the "New World Junior"—has already been inspected by some of the greatest authorities on these matters, and we have every reason to believe from the voluntary encomiums it has received that it will bring to your Company an enormous volume of business.

### "THERMO-XX" GAS-FIRES.

Last year I referred at some length to our "Thermo-XX" gas-fires, and to the vital importance of the ventilation of the apartments to be heated. As you will no doubt have noticed, we have dealt with this in the Radiation advertisements in the various papers from time to time, because we knew that if only the public could be brought to realize that in a gas-fire it is possible to have all the advantages of a coal fire, the same kind of heating they have been used to enjoy from the old coal fire (in other words, radiation), and also that the apartment in which the fire was used would have as comfortable and as healthy an atmosphere as that in which a coal fire was used—if they could be brought to realize these facts, the demand for gas-fires would be enormously increased. Again our success has been strikingly great. At no time during last year were we able—notwithstanding our vast combined productive capacity—to cope with the orders we received for our gas-fires; and we are now making such arrangements as we hope will enable us to meet the demand for this year, which continues to be much in excess of last year's.

### GAS AND VENTILATION.

The usual method of ventilating living-rooms in this country is by the chimney flue, and this is adequately done by the coal fire; but when a gas-fire was placed in front of the existing coal grate, the ventilation became restricted. The problem we set ourselves was that of evolving a gas-fire which would ventilate the room as well as had been done by the coal fire in front of which it was to be placed. The result of our grappling with this problem was the invention embodied in our Radiation "Thermo-XX" gas-fires, and known by the name of the "Injector-Ventilator." This invention has now been before the public for over ten years, and it is the impression it has made on the community which has led to the extraordinarily wide adoption of our "Thermo-XX" gas-grates which obtains to-day. I know that a number of people have a certain notion that electrical heaters are a good thing to use, because, unlike coal fires or gas-fires, they give off no products of combustion requiring to be removed; but in gas-fires these products possess in themselves a great virtue, because they are a valuable means of ventilating the apartment. An electric heater does not assist ventilation as a coal fire or a gas-fire does, and while electric heaters may have their use under certain conditions, yet if the British people want to sit in healthy and comfortable rooms it is difficult to imagine that they would ever become satisfied with this method of heating their rooms—to say nothing of the increased cost. It has to be remembered that one therm of gas equals 30 Board of Trade units of electricity; and if we are to assume that a unit of electricity could be used so as to give 100 p.ct. efficiency, and a gas-fire (say) only 60 p.ct. (which is allowing a much larger margin than Radiation gas-fires require for assisting the ventilation of the room), then one therm would still equal 18 Board of Trade units. If you take into comparison the cost of an electrical unit and the cost of a therm of gas, you will see that gas has no cause to fear competition from electricity for heating purposes.

### EXPENDITURE ON RESEARCH WORK.

There is one matter to which I referred last year, and which I should like to mention again, and that is the cost of our goods to the public. In Radiation, as the public are well aware, we set a very high standard for our goods; and we intend they shall always be the best obtainable in the class of apparatus we make. This has involved a very heavy annual expenditure in research work, which work we are continuing to carry on. Our research work it is which has enabled us to produce goods that ensure the highest possible efficiency, and this means a daily saving of money to every user of our goods. The great utility of our apparatus is beyond question; they are scientifically constructed, yet they are simple to use, and they avoid all cause of anxiety to the public. The materials we use are of the highest order. We do not make apparatus which will work satisfactorily for a short time, and then begin to wear and lay-up trouble for the future. By using the best materials, and by paying attention to every detail in construction, we ensure that our apparatus will give good service over a long period, and will be still continuing to render that good service when apparatus no older, but not constructed on these lines, would have had to be scrapped. It is our aim to make apparatus that shall not only give a higher efficiency than any other apparatus when it is first sent out, but continue to maintain this high efficiency indefinitely. Now all this naturally costs money, and there are people who do not hesitate to copy and use our ideas as far as possible; but the people who merely copy and do not spend money in research, generally fail to find out the reasons why we have done things in a certain particular way. So they are at a disadvantage in trying to produce a copy equal to the original; and while they may cut the price of their copy to some extent, experience over a long period has satisfied us that apparatus made on the lines we have laid down proves in the end to be a good investment, and the difference in cost between the article of the original scientific design and the imitation is saved many times over—frequently in a single year's use.

### GAS AND THE SMOKE NUISANCE.

The modern movement—I might almost call it a rebellion—against the conditions that maintain a pall of smoke over our great industrial centres, is gaining increased strength and momentum year by year. The present state of things has at least three outstanding serious disadvantages.

There is, first of all, waste—the great direct waste of fuel, estimated at 75 p.ct. of the coal used in domestic consumption, together with the total loss of the valuable bye-products obtainable when coal is distilled in gas-works. To this must be added the waste of resources involved in the work of cleaning and renovating interiors and exteriors of buildings, and in the use during the daytime of artificial light which in the absence of the smoke pall would not be required.

In the second place, there is the adverse effect upon public health of breathing air laden with the acid and tarry substances composing the smoke.

In the third place, there is the way in which the inhabitants of our cities are deprived of sunlight—probably the greatest curative agent placed at our disposal by Nature. There is a proverb which runs "All diseases come in the dark and are cured in the sun;" and if the public could realize the damage which is inflicted upon us daily by this deprivation of sunlight, there would be such an agitation as would result in the abolition of all smoke-producing appliances. Owing to its geographical position, the inhabitants of this country never receive an excess of sunshine, not even those located well away from our populous centres, so that it is all the more important that we make the best of our available supply. It is an impossible task to rear an A1 race in a $C_3$ atmosphere.

It is important to remember that, while the smoke emitted from the stacks of factories is the most conspicuous form of air pollution, yet the immense number of domestic firegrates in use throughout the country is, in the aggregate, a far worse source of air pollution by smoke than the industrial offenders. It follows, therefore, that the question of abolishing smoke production in our dwelling-houses is one of the greatest problems affecting national wealth and health. It is perfectly true that, if public interest in this subject could be sufficiently educated and aroused, this would tend to create a demand that all houses to be erected in future should be designed as non-smoke-producing buildings—in other words, that we should bring into being the Ideal Smokeless House. But whatever effect this might have in the long run in preventing the increase of smoke production in the same ratio as at present, it is obvious that, at the best, it would not diminish the vast amount from the millions of domestic and similar buildings that exist throughout the country to-day.

For the solution of both sections of the problem—*i.e.*, the avoiding of the erection of smoke-producing houses in future, and the prevention of continued smoke production from the existing homes of the people, I know of no single means so effective and so widely applicable as the universal use of town gas for industrial and domestic purposes.

In the Ideal Smokeless House there will be a gas-stove for cooking purposes; a gas-heated boiler for supplying the hot water for scullery and bathroom purposes; and in the living-rooms and bedrooms of the Ideal House there will be radiant ventilating gas-fires, and the discomfort, the labour, and above all the smoke associated with the time-honoured coal fire will be totally eliminated once and for all. But, as I have just remarked, important as it is to start without delay to build the Ideal Smokeless House, this would not improve the case of the great number of *un*ideal smoke-producing houses already in existence. It is here that heating by gas comes in to save the situation, in a way impossible with any other form of domestic heating with which I am acquainted. In the innumerable domestic apartments where coal grates are built-in, the remedy is both convenient and inexpensive; there are gas-grates so constructed that they can be placed in front of the coal grate, so as to conceal it entirely, and to appear as if the gas-grate had actually been built into the fireplace.

### THE SERVICE OF THE BRITISH GAS INDUSTRY.

I am by no means sure that the public at large have any adequate knowledge or appreciation of the immense service which has been, and continues to be, rendered to the community by gas and by the gas industry—and in this connection I am referring more particularly to the gas undertakings. The significance of this, and its value, will be best interpreted by those who have had the opportunity of knowing the state of things in some other countries where gas undertakings have shown none of that enterprise which is characteristic of our gas undertakings here; that close study of public requirements, and that strenuous leaving of no stone unturned to meet these requirements, and to develop to the utmost the possibilities of gas as a means of promoting the convenience of the community. To witness the backward condition of things in some other countries, is to realize how very differently the British gas undertakings have viewed their responsibilities and done their work, and to appreciate the state in which things might have been with us had this not been done.

### BRITISH EMPIRE EXHIBITION.

No doubt most of you will be visiting the British Empire Exhibition at Wembley during the next few months, and there you will have an opportunity of realizing the foresight, energy, and enterprise which the gas industry have brought to the display upon a great scale of the capacities and possibilities of gas for rendering public service in a variety of ways. This exhibition promises to be the greatest the world has ever seen, and I think the Englishman will be more than proud when he visits that exhibition and realizes what his countrymen can produce. Those of our shareholders who visit the exhibition will also, I know, be gratified to feel that they are associated with a firm like Radiation—whose apparatus will be displayed there on an imposing scale. The "New World" cooker will, of course, be on view, as also will its consort the "New World Junior."

### CONFIDENCE IN THE FUTURE.

As to the future, he who prophesies is generally unwise; but, given a continuance of anything like fair trading conditions, I have every confidence in the future of your Company. Our ramifications are great. While the gas-stove business continues to be the larger part of our undertaking, yet we have other irons in the fire—not least among them being our Eagle range business (and the name "Eagle Range" is a household word), and also our various foundry businesses. In some of our works we make a great quantity of materials that are required in all building schemes; and with the extensive building operations now going on and those in prospect, we know that we are receiving, and shall receive, our full share of orders for goods required.

Among the many activities of the Company, we are one of the largest gas-meter makers in this country, and this business continues to develop. We have recently made considerable extensions to the works where our meters are manufactured. As makers of industrial gas-furnaces, we are, in our own class of this work, the largest in the country. We have concentrated the furnace manufacturing businesses of all the various Radiation firms in one works, and our facilities in this branch of manufacture are such that we regularly devise and instal industrial furnaces in a variety of types suited to the requirements of all trades.

Yet another important field of operation for gas and gas-apparatus is the manufacture of special large cooking apparatus for hotels, canteens, and institutions. This is a class of work in which all the Radiation firms have had long and wide experience; and the combined result has been that the Radiation firms to-day make and instal apparatus of this kind upon an extensive scale—planning and completely furnishing the kitchens of the largest hotels and canteens, catering in many cases for thousands of workpeople daily—the object achieved in this section, as in that of domestic apparatus, being the maximum duty on the part of the apparatus, with the minimum of fuel consumption.

I should like to express the most cordial appreciation on my own part, and on that of the Directors, of the great loyalty of our staff and workpeople throughout the various works of the Company. Without their untiring efforts on the Company's behalf, and the interest they take individually in their work, the good results which we are able to place before you year after year could not be attained. Each successive year sees an increasing development of the mutual interest between the Company and their workpeople and staff, and an expansion of our canteen arrangements and social and athletic activities—of course, along with ambulance provision—all of which may be grouped under the modern name of "Welfare." The canteens are managed by the staff and workpeople at the various works, and these are carried on financially upon a successful basis—how successful, you may judge from the fact that I know of instances where a good hot dinner of meat and two vegetables can be had at mid-day for 6d. per head, and for an additional 2d. sweets are provided.

I am glad to say that our profits for the past year show improvement on the previous year; and it gives the Directors great pleasure to recommend that the same final dividends as in previous years be declared—making, with the interim dividend already paid, 6 p.ct., less tax, on the preference shares, and 6 p.ct., free of tax, on the ordinary shares.

Mr. William Mathieson seconded the motion, which was unanimously adopted.

## AUSTRALIAN GAS COMPANIES.

The Directors of the Australian Gas Light Company (who supply Sydney) report a net profit for the half-year ended Dec. 31, including the balance brought forward, of £145 520. The payment of a dividend of 4 p.ct. on the old "A" and "B" shares, and in proportion on the new "A" shares, absorbs £104,928, and leaves £40,592 to go forward. The 40,000 additional shares by which the Directors decided to increase the capital of the Company were disposed of at a satisfactory figure.

The Metropolitan of Melbourne Gas Company state that the accounts for the six months show a profit of £95,338. From this sum they have transferred to the reserve fund £25,000, and to the meter renewal fund £5000. The payment of a dividend at the rate of 6s. 6d. a share leaves a balance of £338 to be added to the balance from the previous half-year, making £71,440 to be carried forward.

The Maryborough (Queensland) Gas and Coke Company, Ltd., announce a profit for the six months, after making provision for bad debts and all other charges (including depreciation £250), of £1327, which allows for the payment of the usual dividend of 6 p.ct. per annum (free of State income-tax), and the placing of £90 to reserve for renewals, contingencies, and taxation. The Directors point out that the abnormally large sum of £1296 has been spent on repairs and maintenance during the half-year, and taking this fact into consideration, as well as the keen competition from electricity, the results may be considered satisfactory.

**Buxton Gas Price Reduced.**—The Buxton Town Council have decided to reduce the price of gas, after the March reading of the meters, by 3d. per 1000 c.ft. The prices will then be, for lighting 3s. 6d., for heating and cooking by separate meters 3s. 3d., and for engines 3s. per 1000 c.ft. They have also agreed that the charges for the hire of meters shall be reduced to the pre-war rate. It was stated that the Gas Committee, from their profits for the year, had voted £1000 to the relief of the rates. Mr. Howard congratulated the Gas Engineer (Mr. F. G. Shaw) on the success of the undertakirg.

**Rotherham's Offer to Supply Rawmarsh.**—At a meeting of the Rotherham Town Council last Friday week, the Chairman of the Gas Committee (Alderman Bingham) said they were offering to supply gas in bulk to the Rawmarsh area at a price of 1s. 6d. per 1000 c.ft. It was not "a borough extension stunt," but a business proposition that the Committee had in view. Rotherham had gas to sell, and the price suggested would give Rawmarsh the opportunity of making a considerable reduction in their present charge, which was, he believed, from 4s. 3d. to 4s. 9d. per 1000 c.ft. He hoped at the next meeting to be able to report a further reduction in the price of their own gas, so that Rotherham would have as cheap a supply as they had in Sheffield.

## GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following further notices regarding applications to the Board of Trade under the Gas Regulation Act.

### SPECIAL ORDER.

**Hastings and St. Leonards Gas Company.**

Application is to be made by the Company for an Order under section 10 to extend their limits of supply so as to include the urban district of Battle, and various parishes named; to authorize them to increase the rate of dividend payable on preference capital; to establish profit sharing; to regulate the price and supply of gas; to deal with administrative matters; and for other purposes.

**Uttoxeter Gas-Works, Ltd.**

The Company intend to apply to the Board of Trade for a Special Order under section 10 to enable them to acquire lands, to raise further capital, and to regulate the supply of gas.

### DECLARATIONS OF CALORIFIC VALUE.

**Deal and Walmer Gas and Electricity Company.**—475 B.Th.U. (June 25.)

**Festiniog Urban District Council.**—450 B.Th.U. (April 1.)

**Gravesend and Milton Gas Light Company.**—450 B.Th.U. (June 25.)

**Marple Urban District Council.**—500 B.Th.U. (March 19.)

**Rainford Gas Company, Ltd.**—470 B.Th.U. (June 1.)

**Sittingbourne District Gas Company.**—500 B.Th.U., in substitution for 475 B.Th.U. (June 24.)

## GAS REGULATION ACT ORDERS.

The Director of Gas Administration has forwarded a copy of the following further Order made by the Board of Trade under section 1 of the Gas Regulation Act.

**Brighouse Corporation.**

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 12·2d. per therm.

The minimum 2 in. pressure clause has attached to it the following provisos—

(1) The foregoing provision shall not apply to the area of supply of the undertakers situated outside the borough of Brighouse, or within the said borough in the area known as Sunny Vale, lying to the north of the junction of Halifax Road and Half House Lane, and the area south of the junction of Tofts Grove and Church Street, Rastrick, until after the expiration of three years from the date of this Order; and during the said period of three years the minimum pressure at which gas shall be supplied by the undertakers within the above areas shall be such as, in any main or pipe laid between the main and the meter having an internal diameter of 2 in. and upwards, to balance a column of water 15-10ths of an inch in height.

(2) If the declared calorific value is less than 350 B.Th.U., the minimum permissible pressure at which gas may be supplied shall be that specified in the schedule to this Order.

That is, between 350 B Th.U. and 300 B.Th.U., 2½ in. minimum pressure; and below 300 B.Th.U., as prescribed by the Gas Referees, but not less than 3 in. (March 10.)

## SOUTH BANK AND NORMANBY GAS.

**Application for a Section 10 Order.**

Mr. H. C. Honey (Director of Gas Administration) held an inquiry at the offices of the Board of Trade on Tuesday, March 4, into an application by the South Bank and Normanby Gas Light and Coke Company, for a Special Order under section 10 of the Gas Regulation Act, 1920.

The promoters were represented by Mr. W. SEDGWICK (Messrs. Rees & Frere, Parliamentary Agents). There were present on behalf of the Company Mr. S. Shadbolt (Engineer), Mr. A. E. Kitching (Chairman), and Mr. J. W. R. Punch (Solicitor). The opponents were the London and North Eastern Railway, represented by Mr. W. J. TRIFFETT; and the North Riding of Yorkshire County Council, represented by Mr. J. S. KING (Parliamentary Agent) and Mr. G. DAVY (County Surveyor). There was only slight opposition to the application, and this concerned clause matters, and was quickly disposed of. The main object of the Order is to increase the capital of the Company, but it also deals with a number of minor matters, such as the question of insufficiency of mains to give industrial supply—a matter now under discussion between the National Gas Council and the Railway Companies—stand-by supply, purchase of gas in bulk, and so on.

Mr. SEDGWICK, explaining the general position with regard to the Draft Order, said that the whole of the present share capital of £50,000 had been issued, and the borrowing powers of £25,000 remained to be issued. This amount, however, had been obtained partly by loan (£16,000) from the bank, and partly by drawing on the reserve fund. In this way the actual borrowing powers of £25,000 had been exceeded by £2000, the total amount obtained being £27,000. Arrangements to borrow another £9000 had also been made with the bank. At present the Company had an ordinary sliding-scale reserve fund.

Mr. HONEY said he thought the reserve fund ought to be put on a proper basis, and provision made for a special purposes fund and the application of excess profits. That would have to be done.

Mr. SEDGWICK, continuing, said that the Company were actually £2300 to the bad, and were now asking for total additional capital of £105,000, of which £70,000 was share capital, and £35,000 loan capital. The increase in the make of gas during the period 1910-22 was 105 p.ct.; and if the same rate of increase was maintained during the next decade, the actual make in 1934 would be 312 million c.ft., or an increase of 106 million c.ft., for which provision would have to be made by way of new plant. The district served by the Company was growing rapidly, and he was sorry that no members of the local Council were present to speak from that point of view. The area of the Company adjoined Middlesbrough, and had a very valuable river frontage which contained the large works of such firms as Messrs. Bolckow, Vaughan, Messrs. Smith's docks, Messrs. Swan, Hunter, and Richardson, and the London and North Eastern Railway docks. Ten years ago the inhabitants of the district petitioned for a Charter, unsuccessfully however, because Middlesbrough also petitioned at the same time, and argued that South Bank and Normanby ought to be added to Middlesbrough. The result was that neither side got a Charter. South Bank and Normanby, however, had again petitioned, and their petition was at present under consideration, without opposition. Assuming the rate of increase which he had indicated, both Mr. Shadbolt, the Company's Engineer, and Mr. W. Doig Gibb, the Company's Consulting Engineer, were convinced that the amount of new capital asked for was reasonable. The capital cost per million before the war was £600, and an addition of 20 p.ct. was made for present conditions. This gave a capital cost of £720 per million, which for 160 million c.ft. amounted to £115,000, whereas the Company were only asking for £102,000.

Mr. HONEY remarked that the rate of increase seemed very large.

Mr. *Shadbolt* stated it was supported by the actual position at the present time, because the increase in the last five or six years had been about 60 p ct.

Mr. SEDGWICK mentioned that the local authority had not objected to the new capital proposed.

Mr. HONEY said it seemed to him that an additional share capital of £50,000 ought to be sufficient to see the Company through for a number of years. That would be double the present share capital.

Mr. *Doig Gibb*, asked by Mr. Honey what sort of expenditure was contemplated during the next three years, said that the present works were just capable of making the gas required. The parts of the plant which would have to be increased first would be the purifiers, and then the gasholder, and finally the distribution system. Expenditure upon the latter would continue to be heavy for a considerable number of years, partly because of the increasing demands, and partly because of the increase in the costs of distribution, which had now risen to about 62 p.ct. of the total costs of a gas undertaking, compared with about 30 p.ct. twenty years ago. He knew the district very well, and was convinced that the proposed new capital was a reasonable amount.

Mr. SEDGWICK mentioned that the standard price at present was 17·4d. per therm, and the selling price 1s. per therm. On the 7 p.ct. stock a dividend of 10 p.ct. was being paid, though theoretically, on the sliding-scale, £12 8s. p.ct. could be paid.

Mr. HONEY eventually decided to make the new share capital £60,000, which, together with half borrowing powers, makes a total of £90,000, or, deducting the £2000 by which the present capital is over-spent, the Company will have a total new capital of £88,000.

With regard to the opposition, that of the London and North Eastern Railway was taken first, and clause 14—which lays down that the Gas Company shall not be obliged to give a supply of gas for any purpose other than lighting or domestic use where the capacity of the main is such that to give an industrial supply would interfere with the supply for lighting and domestic purposes—was dealt with.

Mr. HONEY reminded Mr. Triffett that this had been a point of negotiations between the National Gas Council and the Railway Companies, and that it would in all probability be fought before a committee of Parliament in respect of the Marple Order. As any decision of Parliament on this question was bound to be adopted by the Board of Trade, he questioned whether any good purpose would be served by discussing it on this occasion.

Mr. TRIFFETT said his difficulty was that if the matter was not discussed by a Parliamentary Committee on the Marple Order, his opportunity for discussing it in respect of the present Order might be lost.

Mr. HONEY said that if a Parliamentary inquiry was not held on the point, the Board of Trade would hear the Railway Companies on it again in respect of the present Order. He also asked whether Mr. Triffett, in the present case, objected to the precise form of the clause, or to the clause being in at all.

Mr. TRIFFETT said that the objection to the clause in its present form was that there was no limit of time within which a gas company was able to say that the main was insufficient. There was a limit of six months put into the East Hull Order, which the Railway Companies accepted.

Eventually this matter was left over on the understanding that if the point was not discussed in Parliament in connection with the Marple Order, the Railway Company's position in respect of the South Bank Order will not be prejudiced.

Mr. TRIFFETT then referred to clause 18, which deals with stand-by supply. An alteration has been made in the clause originally in the Order, and it now reads as follows:

> Notwithstanding anything contained in the Gas-Works Clauses Act, 1871, or any other Act, a person shall not be entitled to demand from the Company a supply or the continuance of a supply of gas for any premises used for trade or business purposes having a separate supply of electricity or gas for power or other purposes, unless he shall have agreed to pay to the Company such minimum annual sum as will give to them a reasonable return on the capital expenditure and the standing charges incurred by them to meet the possible maximum demand for those premises, and the minimum annual sum to be so paid shall be determined in default of agreement by arbitration in manner provided by the Arbitration Act, 1889 (52 and 53 Vic. c. 49).

The amended clause was opposed by the Railway Company.

Mr. HONEY said the clause was in almost exactly similar terms to the one in the Electricity Supply Act of 1922

Mr. TRIFFETT said the clause, in his opinion, was not clear as to what

was meant by "separate supply." Did it mean a supply from a separate source, or a supply for another purpose by the same consumer? Moreover, there was no mention of "stand-by" in the clause. From that point of view he suggested that the clause was *ultra vires*.

Mr. HONEY said he did not think there need be any discussion on that point. In his opinion it was perfectly clear, and he was prepared to take the responsibility of saying that the clause was not *ultra vires*.

Mr. SEDGWICK said that the promoters had agreed to this new clause with the local authority who had objected to the original clause on the grounds that the proposal to charge a minimum sum of 25s. for a stand-by supply was hard on the consumer. The promoters thereupon pointed out to the local authority that, as they had an electricity undertaking in which a special form of stand-by clause appeared, it might be the case if the clause from the Electricity Supply Act of 1922, with the necessary modifications to meet the case of a gas company, were inserted, and that had been done. Personally, he should have thought that "separate supply" meant a supply from some other source than the gas company.

Mr. TRIFFETT said he objected to the new clause, and preferred the original, with a minimum of 25s. On the other point, as to the meaning of "a separate supply," as he read the clause it meant not a supply from another source, but a supply from the gas company by the same consumer for another purpose, and he asked for the exemption of the Railway Company from a clause which would enable the gas company to demand a minimum payment for the maximum requirements of a consumer. Suppose, for example, a railway company had a large goods yard, half lighted by gas, and half by electricity, was the gas company to demand a minimum payment in respect of the whole of the requirements of the railway company for both electricity and gas, or would the minimum payment be based upon the portion of the yard lighted by gas? As the clause stood at present, it meant the former.

Mr. SEDGWICK agreed that this would be unfair where the electricity and gas supply were in the same hands, but in the present case that did not apply, and Mr. Triffett's point could not arise.

Mr. TRIFFETT repeated that the Railway Company preferred the original clause, with the minimum of 25s.

Mr. HONEY said the Board of Trade were bound to consider that the local authority were much more interested in the protection of the consumer than the Railway Company, and the Board would rather give the preference to the views of the local authority. He did not say this offensively, but the Board must have regard to the views of the representatives of the consumer. At the same time, as a matter of drafting, he would have preferred the clause to have included the words "for the purposes of stand-by only."

Mr. SEDGWICK remarked that this was all the Company asked for.

Mr. TRIFFETT said if that were done it would go a long way to meet the views of the Railway Company.

It was accordingly agreed that the clause should read as follows:

> "Notwithstanding anything contained in the Gas Works Clauses Act, 1871, or any other Act, a person shall not be entitled to demand from the Company for *the purposes of stand-by only* ....."

This concluded the Railway Company's opposition, subject to the discussion of clause 14, as previously mentioned, in the Marple Order.

Mr. KING then dealt with the opposition of the North Riding County Council, and submitted a clause giving the County Council the right to reinstate the surfaces of roads broken up by the Gas Company for the purpose of laying mains. His argument was that under present conditions of heavy traffic and water-bound road construction, the staff of a County Council were much better able to reinstate the top surface of a trench than a gas company, though it would be left to the latter to fill in the trench in the ordinary way. The clause therefore proposed to give this right to the County Council, the Gas Company to be charged upon a schedule of prices. Reference was made to several precedents for this clause in the North Riding, and it was added that in some other cases agreement was come to between the County Council and the gas, water, electricity, or drainage authority for the power to do this final reinstatement. In many cases the County Council were actually asked to do it.

Mr. SEDGWICK, for the promoters, said he objected to legislation on the point, partly because it created a precedent which every other county council in the country would wish to follow, and partly because it was such a simple matter to agree between the parties.

Mr. *Davy* (County Surveyor) said that the results were invariably unsatisfactory when the gas or other company reinstated the surface of present-day roads—this had actually been the case with the South Bank Company.

Mr. *Shadbolt* said he was surprised to hear this.

Mr. *Davy* said he was not suggesting that the Gas Company had done this work negligently, but it was not possible for them with their facilities to do the work as it should be done.

After a little discussion the representatives of the Gas Company expressed a willingness to come to an arrangement for the County Council to carry out reinstatements.

Mr. HONEY expressed the view that he was not at all sure that an important amendment of the law such as that involved in the County Council's proposal ought not to be done by General Act.

Mr KING, on an understanding that an arrangement would be come to on the lines suggested, said he would withdraw this proposal.

Mr. HONEY: We will hold the matter open for a time so that you can let me know when you come to an agreement.

The inquiry then closed.

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An excellent advertisement, due to the originality of the Croydon Gas Company, is at present running in the "Croydon Times." Its merit lies in its simplicity and the fact that a slogan stands out from the well-set type. "Gas, the Spirit of Coal," is certainly an arresting catch-phrase. The advertisement in question shows what can be done by a judicious selection and spacing of good type.

## THE CONTINUED NECESSITY FOR RESEARCH.

In view of the fact that they secured their incorporation last year, special interest attached to the twenty-fourth annual dinner of the Institution of Engineers-in-Charge, which took place on Saturday evening in the Venetian Chamber of the Holborn Restaurant. The chair was occupied by Mr T. Cooper, M.A. (Cantab.). M.Inst.C.E., M.Inst.Mech.E., M.Inst.E.E., the President of the Institution, while the Vice-Chairman was Mr. C. A. Pickles, who is Vice-Chairman of the Institution. Among those present as guests may be mentioned Captain H. Riall Sankey, C.B., C.B.E., M.Inst.C.E., R.E. (Ret.), who is a Past President of the Institution; Mr. W. H. Patchell, M.Inst.C.E., M.Inst.Mech.E., M.Inst.E.E., President of the Institution of Mechanical Engineers; Colonel Sir Arthur R. Holbrook, K.B.E.; Mr. Alexander Russell, M.A., D.Sc., M.Inst.E.E., President of the Institution of Electrical Engineers; Mr. George Evetts, M.Inst.C.E.; Mr. P. M. B. Grenville, President of the Institution of Heating and Ventilating Engineers; Mr. H. G. Burford, M.Inst.Mech.E., M.Inst.A.E., President of the Institution of Automobile Engineers; Brigadier-General Magnus Mowatt, C.B.E., Secretary of the Institution of Mechanical Engineers; and Mr. Leon Gaster, Secretary of the Institution of Illuminating Engineers.

The toast of "The Continued Necessity for Research" was proposed by Captain Riall Sankey, who said he did not think that anybody would deny the necessity for research, and he was sure that no engineer would do so. Why was it necessary that research should be continued? Because progress depended upon it. There was no lack of subjects, and every research led to others. There was not so much difficulty in obtaining men who would carry on this research work, and there were apparatus and plant available, or, if not, they could be procured if funds permitted. It was the securing of the funds which was of the first importance. If they did not collect the necessary money to get on with the research work, then the British Empire, instead of leading the way, as it had done for many years past, would fall back from its proud position. It was absolutely necessary for the welfare of the Empire that they should carry out investigation, and on a much larger scale than had been the case hitherto. Many Government officials needed to be impressed with this necessity. Looking back over a period of years, he thought they would all agree that the amount of research done to-day was gigantic in comparison with what was carried out (say) twenty years ago; but in spite of this they must have still more of it. In the year 1891 the Institution of Mechanical Engineers organized a research on alloys. Since that time there had been eleven reports, all of extreme value, and the Institution of Mechanical Engineers had borne the cost of making this research. Last year, in connection with a suggestion for improving steel, it was decided that the research should be continued, but unfortunately the amount of money required was £5000, which was more than the Institution could provide. A sum of £2500 was, however, gradually collected, and then the Department of Scientific and Industrial Research came along and contributed pound for pound, which made up the amount required. This research had been going on since 1891, and was not yet finished. Could the Institution of Engineers-in-Charge help in finding funds for research? Possibly not, but every member could assist by getting manufacturers and others with whom they might come in contact to contribute, and this he strongly advised them to do.

In responding to the toast, Mr. Alexander Russell pointed out that there were various kinds of research. There was collective research, and there was individual work. In connection with the former, he had recently been inquiring what was being done in America, and was surprised to find that it left this country far behind. Personally, he was not in favour of the indefinite multiplication of research laboratories in this country. The greatest discoveries had been made by individuals working on their own initiative. The Americans carried out team research on a very big scale. In this country there were a great many individual investigators of the highest rank. Research could be furthered in everyday work in all kinds of situations.

Mr. W. H. Patchell, also, in urging the Institution to "live up to" their new incorporation, said each member in his particular job could do a great deal in the way of research.

The Chairman (Mr. T. Cooper) spoke of the objects of the Institution, and remarked that the qualification for full membership was that the applicant must have served an apprenticeship of at least three years with an engineering firm of repute. This was most important. The state of things that existed in London and the Provinces previous to the last (say) twenty years was most unsatisfactory. Men in charge of plants were not competent to be in that position. The waste was terrible. Having engineers in charge who were qualified men must lead to much needed economy and efficiency throughout the country.

Colonel Sir Arthur Holbrook declared that this country was not going ahead in engineering to the extent that it should do if the British Empire was to maintain its position. Years ago this country had the steel trade of the whole world; to-day the steel trade of England did not amount to one-fifth of the trade of America and Germany combined. This was not a state of affairs which they as Britishers cared to see. He was very glad, therefore, that the question of research was being followed up, because it was only in this way that they could advance engineering in this country. To-day the British Empire had great rivals, who must not be permitted to excel it in engineering or in any other branch of science or industry. He would suggest that if they made up their minds to obtain the necessary funds for research, they would get them.

### A PRESENTATION.

The Chairman during the proceedings made a handsome presentation of silver to the Hon. Secretary, Mr. Alfred E. Penn, in recognition of the valuable services he has rendered to the Association for the past nineteen years, during twelve of which he has filled the position of Hon. Secretary, and has recently brought to completion the incorporation of the Institution. The subscribers to the presentation, he said, testified to the kindness, courtesy, and sympathy they had always received from Mr. Penn. The gift was intended to show the affection and esteem in which he was held by all connected with the Institution.

## THE NORTH-EAST COAST COAL TRADE.

### From our Own Correspondent.

The market in the past week has been distinctly on the dull side, and, but for the labour situation, there is little doubt that weakness would have set in.

It is in the export department that business has been lacking. Tonnage has been scarce and arriving irregularly, with the result that collieries, which were apparently fully stemmed, have had to come on the market to clear their outputs. With a strike of dockers at Hamburg, and the vagaries of the exchange rates putting French and Belgian importers into considerable difficulties, the export demand has fallen lower than for a long time past. This situation has, however, been of benefit to inland consumers who, fearing the possible outcome of the wages dispute, have been trying to build-up stocks. This exceptional home demand has likewise helped the collieries and merchants, and prevented any serious falling-away in prices due to the lack of export trade.

Steams have been the firmest spot, but coking has been weak, and supplies obtainable at various prices from 23s. 3d. f.o.b. downwards, according to individual positions of sellers. Best gas has been fairly firm, Wear specials quoting 25s. to 25s. 6d., and best qualities (Holmside, Boldon class) 25s., outputs being well booked under contracts. Second and inferior makes have been rather weak and plentiful at 23s. to 23s. 6d.

## YORKSHIRE AND LANCASHIRE COAL TRADE.

### From Our Local Correspondent.

There is marked activity in all descriptions of coal at the present time, probably due to the menace of a strike. There are more inquiries for gas coal; but whether this is for present consumption or for stock is a matter of conjecture. Householders are looking to the requirements of their cellars; but there does not seem to be any chance of retail orders being executed without delay.

Industrially there is some improvement, which appears to be temporary; the buyers evidently requiring stocks. The nearer Continental countries are hampered by the rates of exchange, and shipments have not been as large as during the past few months.

In Lancashire, the prices remain irregular, and the old official rates are obsolete. Up to 26s. is paid for industrial unscreened coal and up to 20s. for slacks at the pits, although the official prices are shillings below these figures.

The following prices issued at Hull on Thursday are quite nominal. Bunkers: Yorkshire, Derby, and Notts, large screened steam, f.o.b. Humber ports, 26s. 6d. to 28s. 6d.; cargo for export, f.o.b. usual shipping ports: Best Yorks hards, Association, 32s. 6d. to 33s.; Derby best hards, 30s. to 32s.; West Yorkshire Hartleys, 27s. 6d. to 30s.; South Yorks washed doubles, 29s. 6d.; South Yorks washed singles, 28s. 6d. to 29s. 6d.; dry doubles, 25s.; South Yorks washed smalls, 22s. 6d.; Derby slack, 1 in., 17s. 6d.; South Yorks rough slack, 18s. 6d. to 19s. 6d.; gas coke, 40s. to 41s.; foundry furnace coke, 33s.; washed smithy peas, 29s. to 32s. 6d.; and washed steam thirds, 28s. 6d. to 29s. per ton.

## COAL TRADE IN THE MIDLANDS.

### From Our Local Correspondent.

Everybody is trying to accumulate stocks. These endeavours are having little success, however, since current consumption, taken in the aggregate, is quite as large as the output, and there are instances in which industrial operations (as at some of the melting furnaces) are retarded for lack of fuel. Some of the pits are not making anything like a normal output. Influenza and other sicknesses are keeping a good many miners at home; but there are complaints of avoidable absenteeism. The manager of one considerable colliery stated that he had been unable to command much more than half the regular amount of labour. The average is, of course, nothing like as bad as this; but depleted output is responsible for a serious aggravation of the crisis.

There is no appreciable improvement in the position of the gas-works. The market is characterized by extreme stringency. It is not panicky, however. With few exceptions, collieries are facing the emergency, not with the desire to exploit it for selfish purposes, but with a sober determination which reassures anxious customers, even though their requirements cannot be satisfied as they would wish. Deliveries are, in fact, very irregular. The precautionary measures which engineers are taking, particularly in relation to water-gas resources, involve a curtailment of the gas coke supply. At Birmingham, deliveries are being withheld from all except essential services like the preparation of food and manufacturing operations. There is no coke available for heating and domestic use. An easier tendency in blast-furnace coke is attributed to a falling-off in home export demand; but among iron-masters anxiety is not allayed as to the future course of prices. Coal generally remains at about the former level.

**Gas Profit at Chelmsford.**—The District Auditor, reporting on the accounts of the Chelmsford Corporation Gas Department, mentions that the gross profit for the year was £13,629, and the net profit £303, which was appropriated to working capital, now amounting to £8259. The reserve fund stands at £448.

**Reduction in the Price of Gas at Oldbury.**—A reduction of d. per 1000 c.ft. in the price of gas for all purposes has been announced. The new charges will be as follows: For consumption by slot meters, 4s. 4d. per 1000 c.ft.; for consumption by ordinary meters, under 100,000 c.ft. per quarter 4s., over 100,000 c.ft. 3s. 2d., per 1000 c.ft.; for power and industrial purposes, up to 500,000 c.ft. per quarter 3s. 2d., over 500,000 c.ft. 3s., over 1 million c.ft. 2s. 10d., over 2 million c.ft. 2s. 8d., over 3 million c.ft. 2s. 6d. per 1000 c.ft.

## Ipswich Gas Company.

The report adopted at the annual meeting of the Company contained a recommendation for the payment of dividends at the statutory rates on the consolidated and redeemable capital, leaving a balance of £16,981 to be carried forward. The Company have secured a Special Order under the Gas Regulation Act authorizing the conversion of the three classes of "A," "B," and "C" capital stocks into one common consolidated stock, with a small amount of redeemable stock. The co-partnership scheme and superannuation fund have both been revised under the new Order, and the Directors believe the extension of these funds will be for the benefit of all concerned. During the year the price of gas was reduced from 10·4d. to 9·6d. per therm. There has been an increase of 3·67 p.ct. in the quantity of gas sold. Mr. Philip Wyndham Cobbold, LL.B., J.P., has joined the Board, thus making the sixth member of his family to become associated with the Directorate during the last hundred years. The Directors have appointed the Chairman of the Company (Mr. Henry Woodall) as Managing-Director. Mr. Henry Woodall, presiding at the meeting, said it was a great pleasure to submit a report which the Board believed would be considered very satisfactory. The sale of residuals showed an increase of nearly £2000. This was largely due to the fact that they recently bought the Halifax Tar-Works, and the receipts from tar and its products showed a great improvement. They considered themselves fortunate in having been able to retain the services of Mr. C. T. King as Manager of these works. As to the co-partnership scheme, last year the Directors decided that the bonus should no longer be one fixed by them at their discretion, but should be on an understood basis; and it was thought best to make it the same as the dividend paid to the shareholders, varying exactly in the same way, so that the greater the efficiency of the men the better their bonus, as well as the dividend. The net financial result of the year was that they were paying a slightly increased dividend. In fact, the Company had never been in a sounder position. In responding to a vote of thanks, the Chairman said the thanks were really given to the officers and men of the Company, for the Chairman was of little use unless he had their support. Their Company were served in a most exemplary way by all concerned. From Mr. F. Prentice, their Engineer, and Mr. G. A. Mallett, their Secretary, they had had splendid reports of good work done. The Directors would be surprised if the reports were not good, for they knew how well the works were attended to. The feeling with the men had always been extraordinarily good, and he thought in future it would be even better.

## Imperial Continental Gas Association Distribution.

At the annual ordinary general meeting of the Imperial Continental Gas Association, to be held on May 14, the Board of Directors will recommend that, subject to the verification of the accounts by the Auditors, there be paid, on May 20, 1924, upon the holdings of capital stock as registered in the books of the Association on April 22, 1924, a final ordinary dividend for the year ended Dec. 31, 1923, less income-tax at 4s. 7½d. in the pound (being the average rate for the year), at the rate of 5 p.ct. (actual), making with the interim dividend of 5 p.ct. (actual) paid on Nov. 15, 1923, a dividend of 10 p.ct. for the year; also that the sum of £199,586 13s. received from the realization of the German assets, being an accretion to capital which has been realized and turned into money, be dealt with as profit, and applied in payment of a special dividend for the year 1923 at the rate of 10 p.ct. per annum on the nominal amount of the issued capital stock of the Association, such dividend to be paid on May 20, 1924, upon the holdings of capital stock as registered in the books of the Association on April 22, 1924. The capital stock transfer books of the Association will be closed from April 22 to May 5, both days inclusive.

## The Middlesbrough Gas Undertaking.

Councillor J. Wesley Brown (Chairman of the Middlesbrough Corporation Finance Committee), in his annual summary of the past year before a meeting of the Town Council on March 12, said £210,066 was invested in the gas undertaking. This was an excellent concern, and one which continued to prosper. During the year there had been a gradual tendency towards a normal condition of working, and though no reduction in the price of gas had been made, an intimation had been given that one might be expected in the ensuing year. It had been evident to the Gas Committee, in fact he thought to the whole Council, that within the course of a few years it would be necessary to spend a good deal on capital account to meet growing demands. In the present financial condition of the town this might have been deferred for some years, but as an appeal had been made to municipalities throughout the Kingdom to accelerate any capital schemes they had in view, the Gas Committee had decided to go on with this capital expenditure as a scheme for the relief of unemployment, and an application had been made to the Unemployment Grants Committee for assistance in respect of the construction of a new gasholder. The year's trading at the gas-works had fully warranted the Committee making a grant of £5000 towards the relief of rates. They had had under careful consideration the application of their profits in relief of rates, and at their last meeting they decided that it was not in the interests of the undertaking that any more should be taken from this department. Sooner or later this was a policy which would have to be generally recognized, and he thought the Gas Committee were doing the correct thing in adopting it.

Addressing the Bolton Women Citizens' Association, on the "Uses of Gas," Mr. C. H. Beswick, Vice-Chairman of the Gas Committee, declared that gas was destined to take an important part in Bolton's future life. They were out to make gas as popular as possible. To that end they were providing the best apparatus and supplying at the lowest figure. The idea of his Committee was not to have two scales of charges, but to keep costs so low as to suit all purposes—cooking, heating, or lighting. In a four-roomed house, for example, after 2000 c.ft. had been consumed, the price was 2s. 4d. per 1000—which meant a reduction of 1s. 1d. on the third 1000 c.ft.

**New Capital Issue.**—The issue of £7700 of 6 p.ct. redeemable (in 1930) debentures of the Littlehampton Gas Company, recently made by Messrs. A. & W. Richards, was nearly three times subscribed—tenders ranging from £102 per £100 of stock down to the minimum price of par.

**Brentwood Gas Company.**—With a balance available for distribution for the past year of £6362, the Directors recommended the payment of final dividends which, with the interim dividends, make 8 p.ct. on the original stock and £5 12s. p.ct. on the additional stock for the year. The balance to be carried forward is £2445.

**Bexhill Water and Gas Company.**—It was reported at the 73rd meeting of the Company on the 12th inst. that the accounts for the half-year ended Dec. 31 showed a balance at credit of profit and loss account of £12,462 available for dividend. The Directors recommended dividends for the six months, less income-tax, at the rates per annum of 7 p.ct. on the 1885 and 1892 capital, and £4 18s. p.ct. on the 1896, 1901, and 1904 capital—leaving a balance of £7683 to be carried forward.

**Blyth Gas Company.**—The annual meeting was held on March 3, when Mr. A. Watt (Chairman) presented the report and accounts for the year ended Dec. 31 last. The accounts showed a gross profit of £6768. The Directors recommended the payment of a dividend of 3½ p.ct. on the ordinary stock, less income-tax, making, with the interim dividend paid in August last, £7 15s. p.ct. for the year It was decided to carry forward a balance of £4662. During the year the Directors issued, by tender, new ordinary stock at a reserve price of £110 p.ct. The amount offered (£35,000) was largely oversubscribed at an average price of £110 7s. 6d. p.ct. The total capital issued, including premiums, was £36,534.

**Tynemouth Gas Company.**—Presiding at the annual meeting of the Company held at North Shields on March 10, Mr. Thomas Young (Chairman), in moving the adoption of the annual report and balance-sheet, said the quantity of gas sold during the year was 2,570,900 therms—an increase of 6·25 p.ct. as compared with the previous year. The revenue from gas and rentals was £123,408, against £133,913, and from residuals £44,530, against £33,392 in 1922. The price of gas had been reduced during the year by 1d. per therm, and it was decided to make a further reduction of ½d.—*i.e.*, from 10d. to 9½d. per therm—from the March readings of the meters. Half-year dividends (less income-tax) were recommended at the following rates per annum: On the consolidated and new ordinary stock, 5 per cent.; on the new preference stock, 4 p ct.

**The Wellington (Somerset) Gas Company.**—The annual meeting of the Company was held on March 3—Mr. J. Reynolds Miller (Chairman) presiding. The balance of profit on revenue account amounts to £2563, to which is added the sum of £4384 (being the balance carried forward at the end of the previous year), interest £21, dividend on War Loan £25, and profit on sale of stock £2, making a total of £6996, from which has been deducted income-tax £705, leaving a balance of £6291. The Directors recommended the payment of final dividends of 6 p.ct. on the "A" stock, making 11 p.ct. for the year; 3 p ct. on the "B" stock, making 5½ p.ct. for the year; and 2¼ p.ct. on the preference stock, making 4½ p.ct. This will absorb £802, leaving a balance of £4820 to be carried to next account. The gas produced shows an increase of 3¼ million c.ft., equal to 8 p.ct. above that of the previous year.

**East Grinstead Gas and Water Company.**—Dividends of 9½ p.ct. on the original "A" stock and "A" shares, and £6 13s. 4d on the "B" and "C" shares, less income-tax, have been declared for the past year. At the annual meeting, the Chairman (Mr. W. H. Hills) said it was not desired that the shareholders alone should reap the advantage of the Company's prosperity; and he was glad to be able to announce that, as from the March meter readings, there would be another reduction of 1d. per therm in the price of gas. This would make a reduction of close on 1s. 6d. per 1000 c.ft. during the past twelve months, and would bring the price down to 4s. per 1000 c.ft. They had been loyally served in every department. There had been no troubles of any kind during the year, and the employees had been perfectly satisfied. The Directors had also worked harmoniously among themselves, and also with Mr. D. T. Livesey, their excellent Manager, Engineer, and Secretary, and others with whom they had been brought into immediate contact. Mr. Livesey, replying to a vote of thanks, pointed out that he had been with the Company for thirty years. They were now selling gas 13 p.ct. cheaper than thirty years ago, and paying the shareholders 50 p.ct. more in dividends. The capital expended on the gas department represented £504 per million c.ft. of gas made. The public were feeling the benefit of cheaper gas, and the men were getting better wages.

**Woking District Gas Company.**—Submitting the accounts for the half-year ended Dec. 31 at the meeting on Monday of last week, the Directors reported that, in comparison with the corresponding half of 1922, the quantity of gas sold showed an increase of 1,896,000 c.ft., or 3·42 p.ct., and receipts from the sale of residual products an increase of 43·95 p ct. Had it not been that some factories which had been consuming large quantities of gas had wholly or partially closed down, the quantity of gas sold would have shown a much larger increase. If the losses from these sources were eliminated, the increase in the quantity sold for the half-year would have been 3,329,000 c.ft., or 6·36 p.ct. The profit on the half-year's working, after charging interest on debenture capital and temporary loans, amounted to £2419, which, with the sum brought from the previous half-year, made the disposable balance £5104. After payment of the preference dividends and a dividend for the half-year at the rate of 6 p.ct. per annum on the "A" and "B" ordinary stocks, there would be £2806 to be carried forward. The new carbonizing plant commenced to work at the end of October last, but the coal elevator and machinery only came into operation during February of this year. Therefore the economies expected to result from the new plant as a whole were only partially reflected in the accounts, and increased profits were anticipated from the current half-year's working. The Woking Urban District Council had accepted the Company's tender to renew the public lighting contract for a further period of seven years from Sept. 1 next.

**Seaton Gas and Coke Company.**—At the annual general meeting of the Company it was shown that the profit for the year amounted to £867; and after deducting £63 for interest on debentures, and £282 for Bank charges, a net balance of £522 remained. The Directors recommended a dividend of 6 p.ct., less tax. The Chairman proposed a vote of thanks to the Manager, Mr. A. R. Wyatt, and staff.

**Pontypool Gas and Water Company.**—The report of the Pontypool Gas and Water Company states that the gross profits for 1923 were £11,141, while £23 was brought forward. After allowing for prior charges, interim dividend, &c., it is proposed to pay a dividend for the year on the £12 stock and "A" shares of 7½ p.ct. and on the "B," "C," and "D" shares 5½ p.ct., less tax. The balance is carried forward.

**Output of Gas in Lancaster.**—In a paragraph appearing on p. 649 of last week's "Journal," it was stated that while Mr. G. Dixon has been Manager of the Lancaster Corporation Gas Department the output has increased from 154 million c.ft. to 320 million c.ft. What Mr. Till (the Chairman of the Committee) said in the Council was that "since 1900 the output of gas in Lancaster had increased from 154 million c.ft. to 320 million c.ft."

**Redditch Gas Company.**—The report of the Company for the year ended Dec. 31 states that the net profit, including £3953 brought forward, is £8344, less an interim dividend of 2½ p.ct. to June 30. The Directors propose a final dividend on the ordinary shares at the rate of 8 p.ct. per annum, less tax, making 6½ p.ct. for the year, the placing of £250 to reserve, £250 to the insurance fund, and £1000 to reserve, for redemption of preference stock—carrying forward £4216.

**Worthing Gas Capital Issue.**—A new issue of preference capital (the dividend on which is covered more than nine times) in the Worthing Gas Light and Coke Company is announced by Messrs. A. & W. Richards, who are instructed by the Directors to offer for sale by tender £20,000 of 5½ p.ct. irredeemable preference stock. The minimum price of issue is £95 per £100; and tenders must be forwarded to Messrs. Richards, No. 37, Walbrook, E.C. 4, not later than 11 o'clock on Friday next, March 28.

**Further Reduction in Price at Altrincham.**—The Altrincham Gas Company announce that from the March meter readings the price of gas will be further reduced by ½d. per therm (equivalent to 2½d. per 1000 c.ft.) subject to the usual discount of 5 p.ct. on the net charge, if payment is made within the prescribed period. This makes a total reduction of 1s. 1½d. per 1000 c.ft. since December, 1922, when the price was 3s. 11d. The charge will now be 2s. 9½d., less 5 p.ct., which is approximately 2s. 8d. per 1000 c.ft. net.

**Thirsk Gas Company.**—The annual report of the Company states that the revenue account shows a profit of £1346 for the year ended Dec. 31, and the profit and loss account, after being charged with the interim dividend and interest on the debentures, preference shares, and bank charges, has a credit balance of £938 The Directors recommend a dividend for the half-year at the rate of 4 p.ct. on the £12,000 share capital, less income-tax, making, with the interim dividend, 7 p.ct. for the year. The working having proved satisfactory, the Directors are now considering a further reduction in the price of gas, to take effect from March 31 next.

**Brixham Public Lighting.**—The Brixham Gas Company have offered renewal of the lighting contract with the Council for the next twelve months for £800. The Lighting Committee recommended acceptance, subject to the Company agreeing to extend the time of lighting from 10.30 to 11 p.m. The Company refused to concede, but stated that they were willing to offer a revised price for the extra half-hour's lighting. Mr. J. P. Decent considered £800 excessive. He moved an amendment that the Council offer the Company £700, and that the lights be extinguished at 11 p.m. instead of at 10.30 p.m. He contended that the Company could well do the public lighting for £700 and have a handsome profit. Before the war they used to do it for £400. The amendment was carried.

**Stone Gas Company and Electricity Supply.**—At a meeting of the Stone Urban District Council last week, a letter was read from the Electricity Commission enclosing copy of correspondence which had taken place between the Commission and the Stone Gas and Electricity Company. It appeared that the Company had stated that they did not at present intend to fulfil their obligations in regard to the supply of electricity, and asked when a bulk supply would be available from the North-West Midlands Electricity District. The Company had been informed by the Commission that the bulk supply did not appear likely to be available for some time to come, and the immediate developments in Stone would involve the establishment of a local generating plant. The letter was referred to the Lighting Committee.

**No Fears from Electricity.**—At an ordinary general meeting of the Leighton Buzzard Gas Company, Mr. Robert Richmond, J.P., C.A., said that the general experience of gas companies was that the introduction of electricity did not seriously affect them; and he did not think they need be anxious about the future. Their income from lighting was under 20 p.ct. of their total receipts for gas. Considering the large area they supplied, and that it would not pay to lay electric mains in unimportant streets, it was hardly likely that electric light would replace more than 10 p.ct. of the figure he had quoted, which would mean a loss about equal to the increase this year (3½ p.ct. in the sale of gas). They might also lose a few gas-engines, but they had not a large proportion of small users of power like Luton and Northampton. Gas compared favourably with electric light, except for convenience. For intermittent power electricity had the advantage, but for heating and cooking there was a great margin in favour of gas. The relative cost of gas and electricity was, of course, an important item, and there was every reason to hope that now the gas-works were capable of an increased output they would again be able to reduce the price, provided there was no decided increase in the cost of coal and labour. Their present price of 11½d. per therm entitled them to a dividend of £6 1s. 3d. p.ct. on the ordinary stock, but he hoped they would continue their policy of paying only 5 p.ct. until the price of gas was much nearer the pre-war figure.

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**No. 612b Gas Cooker**
with Enamelled back-plate and double plate-rack.

## Lyttelton Gas-Works.

At a recent meeting of the Lyttelton (New Zealand) Borough Council Mr. W. Toy (Chairman of the Lighting Committee) reported that since the previous meeting the gas-works loan of £20,000 had matured. £10,000 had been paid-off out of the special sinking fund, and the remaining £10,000 had been renewed on satisfactory terms. Reviewing the position, Mr. Toy said that prior to 1902 negotiations had been going on for a considerable time between the Lyttelton Borough Council and the Lyttelton Gas, Coal, and Coke Company for the purchase of the gas-works. Finally the Government decided to grant powers to the Lyttelton Council and the Company to buy and sell under the Public Works Act. A vote of the ratepayers was taken and carried by a large majority, granting power to the Borough Council to borrow £15,000 for this purpose; but afterwards it was found necessary to borrow a further sum of £5000. The Council paid £13,000 for the purchase of the works as a going concern, with stock and fittings, &c. It was at once found necessary to purchase three adjoining sections, which required excavating at a considerable cost, for the purpose of building a more up-to-date works. This meant that the whole of the works had to be renewed, including two new holders, new retort-house, with new bench for three settings of five retorts, three large purifiers with gas engine and exhausters in duplicate, and a new enlarged station meter. Outside improvements included a new 6-in. steel main laid from the works to Governor's Bay Road, a 4-in. steel main on the Governor's Bay Road, a 6 in. cast-iron main from Norwich Quay to Exeter Street pumping station, and a 3-in. main from Exeter Street to the Corporation quarries. On the Council taking control, the price of gas was reduced from 10s. to 9s. 2d. per 1000 c.ft. for lighting, and 6s. 8d. for heating and cooking. In 1911 the price was reduced to 5s. 10d. per 1000 c.ft. for all purposes, but owing to the increased cost of coal and labour the price was, during the war period, increased to 8s. 4d., which rate was at present in force. Owing to the foresight of the Borough Council at the time in office in providing for a substantial sinking fund, the Council to-day found themselves with the capital cost reduced by half, so that the capital cost of the works as they stood to-day was set at the low figure of £10,000. It is anticipated that, when the Council's estimates are being framed in April next, a considerable reduction in the price of gas will be announced.

## An Unjust Weighing Machine.

At Holmfirth Police Court, recently, the New Mill Gas Company, Ltd., were summoned for having an unjust weighing machine, which was used chiefly for weighing coke. There was stated to be a deficiency of 2 lbs. on 28 lbs., varying proportionately up to 6½ lbs. in 2 cwt. On every 7 cwt. of coke weighed, there would be a shortage of 20 lbs. The Inspector did not suggest there was wilful intent to defraud; it was merely a case of gross carelessness. Mr. J. H. Fletcher (representing defendant) said the Company thought the Inspector would have warned them of anything wrong with the machine, so that it could be put right at once. The short weight was really infinitesimal in such a thing as coke. He had calculated that if they sold 14 tons of coke by the machine, the public would have lost only 6s. 4d. As a matter of fact, they would have lost nothing, because the Company always gave good measure. Mr. Long (the Manager) said if he had known the machine was wrong, it would have been put right. A fine of £2 with 8s. costs, was imposed.

**Anglo-Romana Gas Merger.**—The "Financial Times" says that an extraordinary meeting of the Anglo Romana Gas Company is to be held at Rome on the 24th inst. to consider a proposal for the merging of the Societa Italiana per le Strade Ferrate della Sicilia into this Company, and for an increase of the capital from 75,000,000 lire to 100,000,000 lire by the issue of 50,000 new shares.

**Gibbons (Dudley) Ltd.**—The Directors will report to the meeting to be held in the Grand Hotel, Birmingham, next Monday, the 24th inst., that the net profit for the year 1923, after providing for depreciation, is £19,662, which, added to the amount brought forward from last year, makes a total of £33,668. A final distribution of 3 p.ct., free of income-tax, upon the ordinary capital will make a total of 10 p.ct. for the year. The Directors recommend that the sum of £2500 be added to the reserve fund, which will raise this fund to £32,500. They report with deep regret the death of their esteemed colleague, Mr. G. E. Gibbons, which took place in April last. In his place, they have appointed Mr. J. R. Masters, who has been for many years connected with the London Office of the Company.

## CURRENT SALES OF GAS PRODUCTS.

### Tar Products in the Provinces.

*March 17.*

The average values for gas-works products during last week were: Gas-works coal tar, 49s. 9d. to 54s. 9d. Pitch, East Coast, 62s. 6d. to 65s. f.o.b. West Coast—Manchester, 60s. to 62s. 6d.; Liverpool, 61s. to 63s. 6d.; Clyde, 62s. to 64s. 6d. Benzole 90 p.ct., North, 1s. 5d. to 1s. 6d.; crude 65 p.ct. at 120° C., 1s. to 1s. 1d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 8d. to 1s. 10d. Toluole, naked, North, 1s. 5d to 1s 6d., nominal. Coal tar crude naphtha in bulk, North, 7¼d. to 8d. Solvent naphtha, naked, North, 1s. 2d. to 1s. 2½d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, liquid, 8d. to 8½d.; salty, 7⅞d. to 8d.; Scotland, 7½d. to 7⅞d. Heavy oils, in bulk, North, 9d. to 9½d. Carbolic acid, 60 p.ct., 2s. 1½d. to 2s. 4½d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

### The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March 17.*

The market for pitch is quiet, and the price is indicated at about 70s. per ton net f.o.b. makers' works. Creosote oil is about 9½d. per gallon net and naked. Tar spirits and products are without material change.

# STOCK MARKET REPORT.

THE violent fluctuations of the franc completely dominated the Stock Markets last week. After touching the high record of 120 to the £, the substantial credits opened by the British and American banks had an immediate effect, and on Tuesday French francs recovered sharply and continued to improve each day, until on Saturday the quotation was 90⅛. Belgian francs, which had fallen to 138, closed at 111¼. There is little doubt that the improvement obtained greatly assisted the French Government in the vote on the Fiscal Bill. The extreme variation caused violent movements in French Rentes and Rails. The 5 p.ct. rose to 21⅜ after dropping to about 18⅜.

Markets were very restricted in British securities. The threatened trouble among the transport workers and the absence of agreement between the coalowners and the miners tended to check business, and the proximity of the settlement accentuated this. Movements in Industrial shares were unimportant, and as usual Gas Stocks (with the exception of companies operating in France, which were naturally affected by the franc fluctuations) continued the even tenour of their way. The only price changes on the week were Gas Light ordinary, which fell ⅛, to 90-92; Gas Light 4 p.ct. preference rose 1, to 77-80; and Imperial Continental, which dropped 2 points, to 138 143.

The following transactions were recorded during the week: On Monday, Commercial 4 p.ct. 93½ *ex* div., European 5, Gas Light and Coke 90⅛, 90⅜, 90⅝, 91¼, 91½, 3½ p ct. maximum 60¼, 4 p.ct. preference 77⅝, 3 p ct. debenture 58. 59, Imperial Continental 138. 139. 141, 143½, Liverpool 7 p.ct. preference 107, Oriental 101, Plymouth and Stonehouse 5 p.ct. 110, Primitiva 8s., 8s. 1½d., 8s. 6d., 4 p.ct. debenture 55, 56, South Metropolitan 95½. 96. Supplementary prices, Redhill 5 p.ct. "B" 75½. 4 p.ct. debenture 70½. Wandsworth 3½ p.ct. new 99 99⅜. On Tuesday, Alliance and Dublin 73. Commercial 4 p.ct. 92½ *ex* div., 3 p.ct. debenture 57, Croydon sliding scale 100, 101 *ex* div, maximum 84, 85 *ex* div., Gas Light and Coke 90⅛, 90⅜, 90⅝, 91, 91⅛, 4 p.ct. preference 78½, Imperial Continental 136, Liverpool 7 p.ct. preference 107½, Primitiva 8s. 3d., 9s., 5 p.ct. preference 33s 6d., South Metropolitan 95 95½ 96, 3 p.ct. debenture 58½, Tottenham "B" 100⅛, Wandsworth 3 p.ct. debenture 57. Supplementary prices, Croydon 4 p.ct. preference 73, Hongkong and China 5 p.ct. debentures 89½, 90. On Wednesday, Alliance and Dublin 74, Bournemouth "B" 12⅜ *ex* div., Gas Light and Coke 90½, 90⅜, 90⅝, 91⅛, 3½ p.ct. maximum 60⅜, 4 p.ct. preference 78. 3 p.ct. debenture 58⅛, Imperial Continental 135, 136, South Metropolitan 95½, 95, Tottenham "B" 100⅛, 100⅜, Tuscan 5 p.ct. debentures 70. Supplementary prices, Colombo 7 p.ct. preference 11⅞, Croydon 4 p.ct. debenture 75½. On Thursday, Alliance and Dublin 72½, 73, Bournemouth 5 p.ct. 13 *ex* div., Brentford "B" 99⅜. 99⅝, Commercial 4 p.ct. 92 *ex* div., Croydon sliding-scale 100, 101 *ex* div., European 5½. 5⅝. 5⅝, Gas Light and Coke 90½, 90⅜, 90⅝ 91. 91⅛, 4 p.ct. preference 78⅜. 3 p.ct. debenture 60, Imperial Continental 135½, 137, 138, 140, 142, Primitiva 5 p.ct. preference 34s., South Metropolitan 95, 95⅛, Tottenham "B" 100⅛, Wandsworth "B" 113 *ex* div., Wimbledon 5 p.ct. 110 *ex* div. Supplementary prices, Liverpool 5 p.ct. 88½. 89⅜. On Friday, Brentford "A" 99⅜. 99⅝. "B" 99⅛, Commercial 4 p.ct. 92. 93½ *ex* div., Continental Union 25. 25⅛, 25⅛. Gas Light and Coke 90, 90⅛, 90⅜, 90⅝, 90⅝ 91⅞, 3½ p.ct. maximum 60⅜, 4 p.ct. preference 78, 3 p.ct. debenture 59, 59⅛, 59⅝. Imperial Continental 137, 140, Oriental 101, 102, Primitiva 8s. 6d., 5 p.ct. preference 33s. 6d., South Metropolitan 95½, 95⅛, 3 p.ct. debenture 58⅛. Supplementary prices, Bath 92, Richmond 5 p.ct. 95½.

On the Foreign Exchanges it was noteworthy that with the renewed strength of the French franc almost every other European currency was marked adversely to sterling; Belgian, Italian, Spanish, Norwegian, and Swedish currencies being dearer at the close of the week. The New York rate moved against us to 4 28⅛.

There was no sale of Treasury Bonds last week. Treasury Bills applications were on a smaller scale, and the average rate of discount was 1s. 10½d. p.ct. less than the previous week at £3 1s. 5·43d. p.ct. The reduction had a weakening influence on the outside discount quotations The rate for day-to-day loans was usually 2½ p.ct., but the customary week-end ease was experienced in the afternoon on Friday, and large supplies were available down to 1 p.ct.

Silver was slightly cheaper during the week, but closed at 33½d. per oz. for cash—being the same price as the previous week.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

| Issue. | Share. | When ex-Dividend. | Ante-War Dividend & Bonus. | Last Divid. at Rate of | NAME. | Closing Prices, July 30, 1914. | Variation. Quotations, March 14. | Variation. Lowest and Highest Prices of Transactions. |
|---|---|---|---|---|---|---|---|---|
| £ | | | p.c. | % p.a. | | | | |
| 151,978 | Stk. | Feb. 7 | — | 5 | Aldershot 5 p.c. max. C. | .. | 70—75 | ... |
| 217,992 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. | .. | 68—73 | ... |
| 1,551,868 | ,, | Oct. 4 | 2½ | 5½ | Alliance & Dublin Ord. | 59—64 | 70—73 | 72—73 |
| 374,000 | ,, | Jan. 10 | 4 | 4 | Do. 4 p.c. Deb. | 76—79 | 60—65 | ... |
| 280,000 | 5 | Oct. 18 | 7½ | 8 | Bombay, Ltd. | 5½—6½ | 5—5½ | ... |
| 100,000 | 10 | Mar. 6 | — | 8½ | Bourne- { 5 p.c. / B 7 p.c. | 13½—13¾* | 13 | ... |
| 383,110 | 10 | ,, | 7 | 7 | mouth Gas and Water { Pref. 6 p.c. | 15—15½ | 11½—12½* | 12½ |
| 115,000 | 10 | ,, | 6 | 6 | 4 p.c. Deb. | 13½—14 | 11—12* | ... |
| 162,025 | — | Dec. 28 | — | 4 | | .. | 75—80 | .. |
| 992,045 | Stk. | Feb. 21 | — | 6⅛ | Brentford A Consolid. | .. | 96—101 | 99½—99½ |
| 734,920 | ,, | ,, | — | 6½ | Do. B New | .. | 96—101 | 99½—99½ |
| 55,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. | 109—111 | 89—94 | ... |
| 221,400 | ,, | Dec. 13 | 4 | 4 | Do. 4 p.c. Deb. | 91—93 | 76—81 | ... |
| 214,740 | ,, | Mar. 6 | 11 | 11½ | Brighton & Hove Orig. | 208—213 | 170—175* | ... |
| 244,200 | ,, | ,, | 8 | 8½ | Do. A Ord. Stk. | 154—159 | 121—127* | ... |
| 1,287,500 | Stk. | Feb. 21 | — | 5 | Bristol 5 p.c. max. | .. | 93½—91½a | ... |
| 851,000 | ,, | — | — | — | British Ord. | .. | 120—125 | ... |
| 100,000 | ,, | — | — | 7 | Do. 7 p.c. Pref. | .. | 123—125 | ... |
| 120,000 | ,, | Dec. 28 | 4 | 4 | Do. 4 p.c. Deb. Stk | 88—90 | 73—78 | ... |
| 100,000 | 10 | ,, | — | 6 | Cape Town & Dis., Ltd' | 1½—2½ | 6½—7½ | ... |
| 100,000 | 10 | Oct. 31 | — | 4½ | Do. 4½ p.c. Pref. | 4—6 | 6—7 | ... |
| 130,000 | Stk. | Dec. 28 | 4½ | 4½ | Do. 4½ p.c. Deb. Stk' | 70—75 | 73—78 | ... |
| 237,860 | ,, | ,, | — | 7½ | Cardiff 7½ p.c. Deb. | .. | 105—110 | ... |
| 137,150 | ,, | Mar. 6 | 5 | 6½ | Chester 5 p.c. Ord. | 108—110 | 85 —90b | ... |
| 1,513,280 | ,, | ,, | 5/9/4 | 6 | Commercial 4 p.c. Stk. | 106—108 | 90—95* | 92—93½ |
| 560,000 | ,, | ,, | 5½ | 6 | Do. 3½ p.c. do. | 103—105 | 90—95* | ... |
| 475,000 | ,, | Dec. 13 | 3 | 3 | Do. 3 p.c. Deb. Stk. | 69½—71½ | 56—60 | 57 |
| 800,000 | ,, | 14 Jan. 15 | 4 | — | Continental Union, Ltd. | 76—79 | 25—30 | 25—25½ |
| 200,000 | ,, | Dec. 13 | 7 | 7 | Do. 7 p.c. Pref. | 115—118 | 75—80 | ... |
| 660,000 | | Mar. 6 | — | 6½ | Croydon sliding scale. | .. | 99—104* | 100—101 |
| 284,975 | | ,, | — | 5 | Do. max. div. | .. | 83—86* | 84—85 |
| 492,270 | Stk. | Feb. 21 | 6 | 4½ | Derby Con. Stk. | 125—135 | 108—110c | ... |
| 55,000 | ,, | Jan. 12 | 4 | 4 | Do. Deb. Stk. | 102—104 | 74—76c | ... |
| 209,000 | ,, | — | — | 5 | East Hull 5 p.c. max. | .. | .. | ... |
| 1,002,180 | 10 | Jan. 24 | 10 | 2 | European, Ltd. | 17½—18 | 5½—6½ | 5—5½ |
| 16,546,120 | Stk. | Feb. 7 | 4/17/4 | 5½ | Gas { 4 p.c. Ord | 98—102 | 90—92 | 90—91½ |
| 2,600,000 | ,, | ,, | 3½ | 3½ | 3½ p.c. max. | 76—79 | 60—63 | 60½—61½ |
| 4,062,235 | ,, | ,, | 4 | 4 | Light { 4 p.c. Con. Pre. | 96—99 | 77—80 | 77½—78½ |
| 4,761,930 | ,, | Dec. 13 | 3 | 3 | and { 3 p.c. Con. Deb. | 72½—74½ | 57—60 | 58—59 |
| 130,000 | ,, | Dec. 11 | 10 | 10 | Coke 10 p.c. Bonds | — | .. | ... |
| 42,000 | — | — | — | 7½ | 7½ p.c. Ilford Deb | .. | .. | ... |
| 82,500 | ,, | Sept. 19 | 5 | 6½ | Hastings & St. L. 5 p.c. | .. | 93—98 | ... |
| 258,740 | ,, | ,, | 3½ | 5½ | Do. 3½ p.c. | 87—89 | 78—83 | ... |
| 70,000 | 10 | Oct. 18 | 11 | 10 | Hongkong & China, Ltd. | 16½—16½ | 16—17 | ... |
| 86,600 | Stk. | Mar. 6 | 9 | 10 | Hornsey 7 p.c. | .. | 140—145* | ... |
| 1,976,000 | ,, | Nov. 15 | 9 | 5 | Imperial Continental | 150—160 | 138—143 | 135—143½ |
| 401,400 | ,, | Feb. 7 | 3½ | 3½ | Do. 3½ p.c. Deb. Red. | 84—86 | 72—75 | ... |
| 235,242 | ,, | Mar. 6 | 6½ | 6½ | Lea Bridge Ord. 5 p.c. | 119—121 | 92—97* | ... |
| 2,127,340 | ,, | Feb. 21 | — | 5½ | Liverpool 5 p.c. Ord. | — | 85½—89½b | ... |
| 600,000 | ,, | Sept. 19 | — | 7 | ,, 7 p.c. Pref. | .. | 100—109b | 107—107½ |
| 165,736 | ,, | Feb. 21 | 7/5/6 | 8 | Maidstone 5 p.c. | — | 124—129 | ... |
| 63,480 | ,, | Dec. 28 | — | — | Do. 3 p.c. Deb | .. | 54—59 | ... |
| 75,000 | 5 | Dec. 13 | 6 | 5 | Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb. | 4½—4¾ | 3¾—3¾ | ... |
| 50,000 | 100 | Oct. 1 | 4½ | 4½ | | 99—101 | 95—98 | ... |
| 341,920 | Stk. | Nov. 29 | 4 | 4 | Montevideo, Ltd. | .. | 54—59 | ... |
| 1 875,892 | ,, | Mar. 6 | 4½ | 5½ | Newcastle & Gatsh'dCon. | 98½—99½ | 86—87d* | ... |
| 250,166 | ,, | ,, | — | 4 | Do. 4 p.c. Pref. Stk. | .. | 73—75d* | ... |
| 129,705 | ,, | Dec. 28 | 3½ | 3½ | Do. 3½ p.c. Deb. | 82—83 | 72—73d | ... |
| 15,000 | 10 | Mar. 6 | — | 11 | North Middlesex 10 p.c. | — | 16—17* | ... |
| 75,940 | 10 | ,, | 7/14/10 | 7⅝ | ,, ,, 7 p.c. | 14—15 | 11½—11¾* | ... |
| 300,000 | Stk. | Nov. 29 | 8 | 9 | Oriental, Ltd. | 117—122 | 97—102 | 101—102 |
| 138,120 | Stk. | Dec. 28 | — | 7½ | Plym'th & Stonh'se 5 p.c. | .. | 107—112 | 110 |
| 60,000 | 50 | Mar. 6 | 13 | 13 | Portsea Island, B | 128—131 | 102—105* | ... |
| 100,000 | 50 | ,, | 12 | 12 | Do. C | 118—121 | 98—103* | ... |
| 1,450,345 | 5 | 29 Oct. 14 | 8 | — | Primitiva Ord. | 5½—6 | ⅛—¼ | 8/—9/- |
| 2,499,800 | 5 | 30 Dec. 15 | 5 | — | Do. 5 p.c Pref. | 4½—5 | 1⅛—1⅛ | 33/6—34/- |
| 341,400 | 100 | Dec. 3 | 4 | 4 | Do. 4 p.c. Deb. | 91—93 | 70—75 | ... |
| 600,000 | Stk. | Jan. 24 | 4 | 4 | Do ,, ,, 1911 | .. | 54—57 | 55—56 |
| 220,335 | ,, | Dec. 28 | 4 | 4 | Do. B. Aires 4 p.c Deb. | 85—87 | 55—58 | ... |
| 321,670 | ,, | ,, | 4 | 4 | Do. Riv. Pl. 4 p.c. Deb. | 85—87 | 55—58 | ... |
| 150,000 | 10 | Oct. 4 | 6 | 6 | San Paulo { 6 p.c. Pref. | 10½—11 | 5⅛—6⅛ | ... |
| 125,000 | 50 | Jan. 2 | 5 | 5 | { 5 p.c. Deb. | 47—49 | 37—40 | ... |
| 270,000 | Stk. | Aug. 23 | — | 5 | Sheffield A | .. | 100—102e | ... |
| 419,968 | ,, | ,, | — | 5 | Do. B | .. | 100—102e | ... |
| 1,047,000 | ,, | ,, | — | 5 | Do. C | .. | 100—102e | ... |
| 133,201 | Stk. | — | 4 | 6 | Shrewsbury 5 p.c. | — | .. | ... |
| 90,000 | 10 | Oct. 18 | 9 | 6 | South African | 10½—11½ | 7—9 | ... |
| 5,609,893 | Stk. | Feb. 21 | 5/9/4 | 6½ | South Met. Ord. | 111—113 | 94—96 | 95—96 |
| 102,580 | ,, | Jan. 10 | — | 5 | Do. Red. Pref. | — | 98—100 | ... |
| 1,895,443 | ,, | ,, | 3 | 3 | Do. 3 p.c. Deb. | 72½—74½ | 57—60 | 58½—58½ |
| 734,000 | ,, | Mar. 6 | — | 6½ | Do. 6½ p.c. Deb. | .. | 102—104* | ... |
| 91,500 | ,, | Aug. 23 | 8½ | 8½ | South Shields Con. Stk. | 157—159 | 136—138d | ... |
| 1,087,795 | ,, | Feb. 21 | 6 | 6½ | S'th Suburb'n Ord. 5 p.c. | 114—116 | 95—100 | ... |
| 368,837 | ,, | Dec. 28 | 5 | 5 | Do. 5 p.c. Deb. Stk. | 116—118 | 95—100 | ... |
| 647,740 | ,, | Nov. 15 | 5 | 5 | S'th'mpt'n Ord. 5p.c. max | 99—102 | 86—89 | ... |
| 121,375 | ,, | Dec 28 | 4 | 4 | Do. 4 p.c. Deb. Stk. | .. | 74—79 | ... |
| 250,000 | ,, | Mar. 6 | — | 7 | Swansea 7 p.c. Pref. Stk. | .. | 100—102* | ... |
| 200,000 | ,, | Dec. 28 | — | 6½ | Do. 6½ p.c. Deb. Stk. | .. | 102—104 | ... |
| 120,000 | ,, | Feb. 21 | — | 8 | Tottenham { A 5 p.c. | 135—138 | 119—124 | ... |
| 882,375 | ,, | ,, | 6 | 6½ | { B 3½ p.c. | 115—117 | 98 —103 | 100½—100½ |
| 181,255 | ,, | Dec. 13 | 4 | 4 | District { 4 p.c. Deb | 87—89 | 77—81 | ... |
| 258,251 | Stk | Aug. 23 | 1 | 5 | Tynemouth 5 p.c. max. | 108½—109 | 84—86d | ... |
| 30,000 | , | Mar. 6 | 8½ | 9½ | Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c. | 131—136 | 132—137* | ... |
| 255,636 | ,, | ,, | 6½ | 7½ | Do. B 3½ p.c. | 129—134 | 110—115* | 113 |
| 108,075 | ,, | ,, | 5/17/3 | 6/7/9 | Do. C. | 110—115 | 96 —101* | ... |
| 240,865 | ,, | ,, | — | 6/7/9 | New Ordinary | .. | .. | ... |
| 352,000 | ,, | ,, | 6½ | 7½ | Wimbledon 5 p.c. | 117—122 | 105—110* | 110 |
| 98,000 | ,, | ,, | 6½ | 7½ | Epsom 5 p.c. | 121—126 | 112—117* | ... |
| 88,416 | ,, | Dec. 28 | 3 | 3 | 5 p.c Deb. Stk. | 66—69 | 56—61 | 57 |

a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. * Ex div.


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**London County Council Gas and Electricity Supplies.**—A report by a Special Committee on Organization of the Council's Service was adopted without discussion at a recent meeting of the London County Council. One of the recommendations was: "That the Chief Engineer be responsible for the negotiation of terms for supplies of gas and electricity for all services except the tramways service, and that information as to supplies for the tramways service be furnished by the General Manager, Tramways Department, to the Chief Engineer." The Committee considered in the early part of 1923 the question of the desirableness of placing on one chief officer the responsibility for the negotiation of terms for the supply of gas and electricity for the various services. A return then submitted showed that accounts were received from 51 supply authorities (18 gas and 33 electricity) in respect of 1861 supply services; the total charge amounting to £262,626. They considered that in connection with so large an expenditure there was room for some general oversight with a view to seeing that the best terms were obtained in all cases. It was arranged that for six months from July 1, 1923, the Chief Engineer should be made responsible for the negotiation of terms for supplies of gas and electricity for all services except the tramways service, information as to which, however, should be furnished to the Chief Engineer. This has already proved to be of benefit to the Council.

**Belfast Gas Undertaking.**—A special meeting of the Belfast Corporation agreed to recommend that the Gas Committee be authorized to grant from profits the sum necessary to provide for the interest and sinking fund on the capital expenditure in connection with the City Hall, estimated at £14,000. A member moved an amendment (which was lost by a large majority) to the effect that the continuation of this payment be not approved, and that the gas consumers receive the benefit of the surplus funds. He urged that the Finance Committee had agreed to recommend an increase of 1d. on lower valuations, and that the rates on higher valuations should be reduced by 2d.; and now it was proposed to give the Gas Committee power to make the lower valuations. This he thought was an unfair arrangement. Sir Wm. Coates, ex-Lord Mayor, said it was wrong to make it appear that the profits of the gas undertaking belonged to the consumers. They belonged to the ratepayers, so long as the consumers got good value, and of that there was now no question. The ratepayers should get something out of the undertaking and out of the profits in relief of rates, because the ratepayers were the people who pledged their credit to give the gas undertaking cheap money in the old days. Supposing the undertaking were a failure, the burden would fall on the rates; but, since it was a success, it was only reasonable that the ratepayers should get a certain amount of benefit. If the amendment were adopted, it would mean an increase in the rates of 2d. on all valuations. In his opinion, the proposal of authorization to the Gas Committee was fair and reasonable.

**Fire in a Governor House.**—Great credit is due to Mr. L. Shaw, the Manager of the Rothwell Gas-Works, for the manner in which, at midnight, though not yet recovered from a recent operation, he rushed to attend to a fire which had broken out in the district governor house. In his efforts to deal with the outbreak Mr. Shaw received facial burns. All the windows of the governor house were broken, the woodwork of the house was badly charred, and a hole was burned through the ceiling. A rough estimate of the amount of the damage is £100.

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The Shireoaks Colliery Company, who are supplying gas to the Clowne district of Derbyshire, have declined to accede to a suggestion of the Parish Council that they should reduce the price of gas from 5s. to 4s. per 1000 c.ft.

The Bolton Corporation are applying to the Ministry of Health for sanction to borrow £185,643, which includes the Gas Committee's application for £12,125 for new workshops and stores in Spa Road and £9400 for alterations at the Gas Street Works.

Mr. J. P. Leather, of Burnley, to increase the sale of gas apparatus, proposes to give a series of lectures to the maintenance men and meter inspectors, and to employ such men in taking a census of gas apparatus in all the houses in the borough. He is also to hold gas exhibitions in the out districts covered by the department, and to engage a lady cookery lecturer in connection with such exhibitions.

Mr. P. S. Hoyte, Engineer of the Plymouth and Stonehouse Gas Company, gave on the 6th inst. an interesting lecture at Plymouth Institution, on "Coal Gas and Its Manufacture." He described the early history of the process, the so-called "destructive" distillation of coal, the various plant used, and the therm system of charging for gas. He also dealt with gaseous fuel from the domestic, civic, and national standpoints. The lecture was illustrated with a number of lantern slides, many of which related to the Plymouth Gas Company's works at Coxside.

The annual works and staff dinner of the Swansea Gas Light Company was held on March 12—Mr. W. H. Johns, the Engineer and Manager, presiding. Following the loyal toast, Mr. Crutchley, supported by Mr. F. J. Coates, toasted the success and prosperity of the Swansea Gas Light Company, and Col. David Lewis, the Deputy-Chairman, in the unavoidable absence of the Chairman (Mr. Ernest H. Leeder) suitably responded. Mr. Johns, in the course of his remarks, commented upon the success of the Works Cricket Club, and hoped that, when the new works at Morriston were in operation, it would be possible to provide a sports ground for the recreation of all the employees of the Company. An enjoyable musical programme concluded the evening.


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Town Hall, Burnley,
March 18, 1924.

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